UNITED STATES OF AMERICA

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B19574

Ann Journey
Book

1811

A Present from my
Friend Nancy Potts
March the 24th — 1809 — H

TELLIAMED;

OR, THE

WORLD EXPLAIN'D:

CONTAINING

DISCOURSES

BETWEEN AN

Indian Philosopher

AND A

MISSIONARY,

ON THE

DIMINUTION OF THE SEA—

THE

FORMATION OF THE EARTH—

THE

ORIGIN OF MEN & ANIMALS:

AND OTHER

SINGULAR SUBJECTS,

RELATING TO

Natural History & Philosophy.

—A VERY CURIOUS WORK.—

SUPPL. 8408

BALTIMORE:

PRINTED *by W. PECHIN, No. 15, Market-street—*
for D. PORTER, at the OBSERVATORY,
FEDERAL-HILL.

1797.

PREFACE.

IT is a ſtrange deſign to attempt to prove to men that they are in an error; but it would be ſtill ſtranger to be willing to force them to confeſs that they are ſo.—In a word, as a celebrated Poeteſs has very well expreſſed herſelf.*

Nul n'eſt content de ſa fortune,
Ni mecontent de ſon eſprit.†

MAN is naturally prepoſſed in favor of his own knowledge—experience every day in vain attempts to ſhew him his ignorance and his blindneſs. When he has been a hundred times ſhewn his error, he does not for this believe himſelf leſs clear-ſighted, or leſs infallible. Provided we grant him but this one point, he will perhaps condemn all the reſt. The qualities of the heart, which are the bonds of ſociety for which he was born, ſeem to intereſt him leſs ſenſibly, than the agreeable idea he has conceived of the extent of his genius. He is at firſt diſpoſed to revolt againſt every thing which has a tendency to rectify his judgment, and ſhew him that he is deceived. Every one conſents readily to be deceived by his heart, but nobody is willing to be deceived by his judgment.

* *Mad. des Houlieres.*

† No man is content with his fortune—nor diſcontent with his judgment.

THERE are, however, errors, which are not the leſs ſuch for being generally believed. The antiquity or univerſality of an opinion, is by no means the ſtandard of truth. I am of the opinion of an illuſtrious author*, who thinks, that in order to guard againſt error, the antiquity of an opinion is leſs a proof of its authenticity, than a juſt reaſon to call it in doubt, ſuſpect it, and conſequently not embrace it till after mature deliberation. To ſay that our anceſtors have believed a thing, is a pitiful and pernicious argument, which cramps the mind, deſtroys reaſon, favours ignorance and error, and only proves, that in all ages men have been credulous; that ſince the number of ignorant and fooliſh men is greater than that of the wiſe and ſagacious, truth is not always to be eſtimated by the multitude†; that the more ancient an opinion is, the nearer it approaches to the fabulous times; and that conſequently there is no ſentiment leſs worthy of reception, than that which has no more ſolid foundations than thoſe of time, and the multitude of votaries. Experience furniſhes us with ſo many proofs of this truth, that it would be an affront to the judgment of the reader, to pretend to give him inſtances of it.

* *The ſecond principle that leads a people into error, is a blind veneration for antiquity. Our fathers, ſay we, have believed ſuch a doctrine, who ſhould be preſumed to be wiſer than they? If a folly is but conſiderably ſubdivided, this principle preſerves it for ever. It ſhould, on the contrary, ſatisfy us, that our fathers were but little removed from us.*
FONTENELLE on the origin of fables.

† *The teſtimony of thoſe who believe a thing, ſhould eſtabliſh it, has no force to ſhake it; but the teſtimony of thoſe who do not believe it, has force to deſtroy it.* Fontenelle's hiſtory of oracles.

Grave etiam argumentum illi videbatur, quod omnes de Dis immortalibus, et omnium eſſet, et paene de uno conſentio.—Placet igitur tantas res opinione ſtultorum judicari, perſpectum qui illos inſanos eſſe dicatis. Cic. de Nat. Deor. Lib. 3.

THE work now presented to the public, has been formed upon these principles. It is so singular, so much an original, and so very different from the common way of thinking, that the reader must acknowledge the whole to be new. The author is a bold philosopher—he reasons with uncommon liberty, and from plausible observations, and incontestable facts, builds a connected and coherent system. If his work is bad, he has the mortification of not succeeding, and if it is good, we reap the profit of his diligent researches.

As this work may fall into the hands of the learned, as well as the ignorant, we heartily wish that both may find their account in it. It is a great advantage for an author, when he knows how to mix delight with profit, without permitting erudition to lose any thing of its value, or suffering pleasant raillery to degenerate into pedantry and ostentation. But our *Indian* philosopher is so grave, that he never quits the serious and scientific strain. These *Indians* are an admirable set of men, and perhaps of all the animals God has made, none are less addicted to laughing. We must however apprise those readers, who seek for nothing but amusement in books, that this work is not absolutely destitute of entertaining narratives; that the second and sixth conversations, for instance, will furnish them with a considerable number of facts, which tho' related simply, and without ornament, will not fail to please them; and that the reading of the rest, will only cost them a moderate application. The reasonings of our *Indian* are generally so easy, and so far from being abstruse, that they require no more attention than that which our ladies daily bestow on a play or a romance. He never presents us with those metaphysical ideas, whose traces sometimes escape the reach of the

greateſt penetration. He follows nature ſtep by ſtep, repreſents her moſt ordinary, and ſometimes her moſt rare and ſingular productions. Is there any thing more pleaſing than an obſervation of what nature daily performs before our eyes? What is more agreeable than to catch her as it were at work, and force her to diſplay her moſt ſecret myſteries to us?

The author could not have choſen a ſubject more capable of exciting the curioſity, not only of the learned, but of every man who is at the pains to think. Nothing is more important to us, than to be acquainted with the nature of the Globe we inhabit, which our anceſtors inhabited before us, and which our poſterity will inhabit ſo long as it ſhall ſubſiſt in the abyſs of ages, the end of which is unknown to us; to examine whence it proceeded, how it was formed, what revolutions it has undergone, what its preſent ſtate is, and to what viciſſitudes it may be hereafter expoſed.—If man is born to induſtry, it is more reaſonable that he ſhould be induſtrious about that which nearly concerns him, than about things which do not affect him.

The author of the new dialogues of the dead*, ingeniouſly rallies thoſe philoſophers, who by an unpardonable abuſe of their time and talents, tread upon man, becauſe they do not know him, and often addict themſelves to ſtudies, which only tend to render them more vain and ridiculous than they were before. This reproach is equally due to moſt men of learning. But this perverſe uſe of the human powers, is in no caſe more diſcernable, than in what relates to man himſelf. I know the

* *Dialogue between* Paracelſus *and* Moliere.

ſurprizing progreſs which within theſe two ages philoſophy has made on this ſubject. Anatomy brought to a greater perfection, and the nature of the ſoul better deſcribed, than for five or ſix thouſand years before, are ſenſible proofs of the genius, and juſt diſcernment of our moderns.—Among a vaſt number of frivolous ſtudies, they do not neglect ſuch as are moſt important.

The nature and origin of our Globe have not been ſo well treated of by any other author; with reſpect to its origin, among the various opinions, which in all ages have divided mankind, all have agreed, that there was a period in which the world began to be inhabited; whether it was from eternity, as ſome of the ancient philoſophers maintained, or whether it began to exiſt in time, as reaſon and religion induce us to believe this.—the human judgment has not as yet penetrated into. Religion in ſome, in others the prejudice of education, and in all, the obſcurity of the ſubject, hinder them from carrying their reſearches farther. If ſome ancient philoſophers, and even learned nations, have pretended to explain the manner in which this univerſe was formed, the ages in which they lived have ſeen that they only ſpread fables and romances under their moſt ſubtile ſyſtems, and moſt myſterious allegories.

What relates to the nature of our globe, has not been better cleared up. This rude and unformed maſs which ſupports and nouriſhes us, includes in its entrails numberleſs miracles, worthy of the longeſt and deepeſt ſtudy; ſuch as minerals, metals, foſſils, &c. and among theſe different ſpecies there is an infinite variety, the cauſe of which is but little known, ſince we have not made it our buſineſs to find it out. Prepoſſeſſed with

this general idea, that God by a ſingle word, in an inſtant, produced the world out of nothing, we fooliſhly imagine, that this inhabited globe came from his hands in the ſtate in which we ſee it, and upon this principle we have haſtily concluded that it was needleſs to ſeek for any other reaſon than his omnipotence and will, for the prodigious variety obſervable in the compoſition of this globe. I leave mankind to judge of the truth of the conſequence, by the abſurdity of the principle; for without expatiating on this ſubject, let us only conſider the different colours daily ſeen ſo whimſically mixed in the ſame piece of marble. To have recourſe to the will of God, in order to explain this variety, is to have recourſe to the occult qualities of the ancients, and tacitly confeſs our own ignorance; for to attribute this infinite variety to a ſupreme intelligence, without ſuppoſing an end for it, is at once to affirm and deny his exiſtence.——What end worthy of God can we find in theſe inſtruments of human vanity, ſo long buried in the abyſs which concealed them.

What ſhall I ſay of that infinite number of extraneous bodies found in the hardeſt ſtones and marbles, or of thoſe which in mountains, of ſhells and ſea bodies, which nature ſeems to have collected on purpoſe in places the moſt remote from thoſe in which they were formed. To confeſt the truth of theſe facts, as ſome have done, to deny the heterogeneity of theſe bodies inſerted in others of a quite different ſpecies, and not to grant the origin of theſe ſea-bodies found in grounds the moſt remote from their element, is not only to belie the conſtant teſtimony of our ſenſes, but alſo to renounce reaſon, and contradict good ſenſe. Some learned men have for this reaſon

determined, not to inveſtigate the cauſe of an effect which they could not call in queſtion. Their different ſentiments are explained or refuted in this work. It is true, ſome have had ſuch abſurd opinions of this matter, that they do not deſerve refutation. Others with more penetrating eyes, and leſs prejudiced in favour of vulgar opinions, have carefully obſerved the compoſition of the different grounds of our globe. They have had conſiderable penetration, and ſeem to have had a glimmering view of truth; but becauſe their eyes were as yet too weak to bear her ſplendor, ſhe made her eſcape from them. Nature ſeemed to offer herſelf to them, without being hid in clouds. They wanted but to make one ſtep into the moſt ſecret places of her ſanctuary. But the ſmall ſucceſs of a great many reſearches has too often proved, that this laſt ſtep is the longeſt, and the moſt difficult to be made. It was therefore reſerved for TELLIAMED, firſt to penetrate into the dark receſſes, where nature ſeems to wrap herſelf up in myſteries, to force her thence, and to reveal her ſecrets to us. It is he, who, concerning the origin and nature of this globe, gives us not ſimple conjectures, as many have done before him, but a certain knowledge founded on long, laborious, and exact reſearches, on inconteſtable facts, and upon laſting and ſenſible monuments of the great principles of the truths which he has diſcovered, and of the conſequences which he has drawn from them.

IT is aſtoniſhing, that in order to acquire this knowledge, he ſeems to have prevented the natural order, ſince inſtead of firſt attempting to inveſtigate the origin of our globe, he has begun with inſtructing himſelf concerning its nature. This reverſement of order has been in him the effect of

a happy genius, which has led him ſtep by ſtep to the moſt ſublime diſcoveries. It is in decompounding this globe by an exact anatomy of all its parts, that he has firſt learned of what ſubſtances it was compoſed, and what arrangements theſe ſubſtances obſerved among each other. This knowledge joined to that ariſing from compariſon, always neceſſary in the man who attempts to penetrate the veils in which nature loves to hide herſelf, has ſerved as a guide to our philoſopher, to arrive at the moſt important knowledge. By the matter and arrangement of theſe compoſitions, he has diſcovered the true origin of this globe, how and by whom it was formed. Hence, by natural conſequences, he has fixed in ſome meaſure, not the firſt inſtant of its exiſtence, which he did not believe poſſible for human reaſon to do, but the period at which it commenced to be habitable, that in which it began to be peopled, and that in which it may ceaſe to be ſo. He has alſo laid before us all the revolutions, to which not only this globe, but all the others in the univerſe, may be ſubject in the immenſity of ages.

We can only judge by reading the work itſelf, how many meditations and reſearches were requiſite to produce a ſyſtem ſo *new* and *ſingular*, ſo connected and coherent. Perhaps it will not be improper to give a ſhort analyſis of it here. I muſt however promiſe, that I have no deſign to take any party for or againſt him; and that conſequently, if there is any thing advantageous in this extract, to the ſyſtem of the *Indian* philoſopher, it ought to be looked upon as coming from an author who is highly charmed with his ideas.

That all the grounds of which our globe is compoſed, even the higheſt mountains, have riſen out

of the waters; that they are the work of the sea, and have all been formed in her bosom, must at first certainly be thought a paradox, but, if we follow the deductions and researches of TELLIAMED, this paradox will appear to be a truth.

IF we narrowly examine, says this philosopher, the substance of our grounds, we observe nothing uniform in them, nothing but what indicates in their composition, the effect of a blind and successive cause; sand, mud, flints, confounded together, and united by a cement which makes but one mass of these different bodies; beds of those substances applied over each other, and preserving always the same arrangement, when they have not been disturbed by a foreign though known cause. If the sea forms in her bosom similar collections, composed of the same substances united by the salt which is proper to these waters, and which serves as a cement to them, arranged also in beds and layers, and disposed in the same direction, how is it possible for us not to be struck with such an agreement? But if this resemblance extends to the position of these collections; if it is the same in the bosom of the sea as upon land; if there as well as here, they are situated in the same manner; if on the grounds on dry land we observe, as well as in those covered by the waters, evident traces of the work of the sea, and of the assaults she has made upon them; who will be so obstinate as to refuse his assent to the truth arising so clearly from this discovery.

THIS so sensible proof of the origin of our grounds, continued he, becomes a demonstration, by the extraneous bodies inserted in their substances. We can distinguish two different species of these, which both concur to establish this truth.—

The firſt are terreſtrial bodies, ſuch as trees, leaves, plants, wood, iron, reptiles, and even human bones, found in the heart of the hardeſt ſtones and marbles. The ſecond are ſea-bodies, ſuch as ſhells of all ſorts, known and unknown, coralls, beds of oyſters, bones of ſea fiſh, and even fiſh themſelves either intire or mutilated. Theſe ſea-bodies ſpread on the ſurface of the earth, are not in a ſmall, but in an almoſt infinite number. They are not to be found in one ſingle quarry perhaps placed on the coaſt, but are to be met with in all countries of the world, in places the moſt diſtant from the ſea, on the ſurface of the mountains, and even at the bottom of their entrails. There are whole mountains of them, and theſe ſea-bodies are really ſuch, notwithſtanding the ſorry reaſons of ſome literati, who at the expence of good ſenſe have dared to maintain the contrary.

Now from theſe two ſpecies of extraneous bodies inſerted in the ſubſtance of our globe, there reſults, according to TELLIAMED, a demonſtration of his principle, that our grounds are the works of the ſea. In a word, ſays he, it is evident, that theſe bodies whether terreſtrial or marine, could not have penetrated into the maſſes in which they are atpreſent found, except at a time when theſe ſubſtances of theſe maſſes were ſoft and liquid; neither is it leſs evident, that theſe ſea-bodies could have only been carried by the ſea into places at preſent ſo far diſtant from her. It is alſo certain, that theſe extraneous bodies either of the terreſtrial or ſea-kind, are found on the tops of our higheſt mountains. To attribute this prodigy to the deluge, is, according to our philoſopher, an indefenſible opinion. We muſt therefore, ſays he, draw this certain and neceſſary concluſion, that there has been a time when the ſea covered the

higheſt mountains of our globe; that ſhe covered them for a conſiderable number of years or ages, in order to knead and form them in her boſom; and that ſhe has afterwards diminiſhed by all the bulk of the waters ſuppoſed to be contained between their higheſt ſummits, and her preſent ſurface. This proof, continues he, which at firſt ſeems ſhocking, is confirmed daily, by the actual prolongation of our lands, which are viſibly enlarged, and which ſhew us ſhores and harbours filled up and effaced, while others appear to ſupply their places. With how many examples does hiſtory furniſh us of cities which the ſea has left, and of countries which ſhe has deſerted?

The apparent grounds then of our globe, are inconteſtably, adds he, the work of the ſea; and ſince ſhe has been diminiſhed by all their height, it is evident that the cauſe of this diminution ſubſiſting always, ſhe ſtill continues to diminiſh in like manner. From this principle ariſes a diſcovery, from which Telliamed knows how to draw a numerous train of conſequences. In a word, ſays he, if it is true that the ſea diminiſhes, it is no leſs evident, that there is no impoſſibility of finding the juſt meaſure of her real diminution. Now in comparing this preſent diminution with the elevation of our higheſt mountains, cannot we alſo diſcover the period of time, which the ſea has employed in ſubſiſting from all this elevation to her preſent ſurface, and conſequently knew the number of ages elapſed ſince our globe became habitable? By comparing this ſort of diminution at preſent, with the actual depth of the ſea, cannot we alſo have the juſt meaſure of her future diminution, and conſequently foreſee the number of ages neceſſary for her total exhauſtion, and perhaps for the burning of the whole globe?

THE *Indian* philoſopher is not content with having found out the origin of the earth which we inhabit; the knowledge he acquired in ſtudying this ſubject, has conducted him to other diſcoveries equally curious, and ſtill more intereſting. The very foundation of his ſyſtem has furniſhed him with a proof, that in proportion as this globe exiſts, and as the animation of all that has life in it continues, there are formed, even in its boſom, the cauſes of the annihilation of that vital ſpirit which muſt one day ceaſe in it, and lay a foundation for its burning. It is nearly thus, that during life the human body accumulates and collects what will one day be the principle of its deſtruction. Now from this, by a natural conſequence, the *Indian* philoſopher has concluded, that the ſame thing happened in all the other globes. In a word, he has obſerved that there is a perpetual motion in this univerſe, even with reſpect to its ſubſtance, and that there is a continual change in all the globes of which it is compoſed; that very conſiderable changes are obſervable in the moon, as well as in the globe of the earth, and in the body of the ſun, as well as in the moſt diſtant of our planets; that after having ſhined for ſeveral ages, certain ſtars have diſappeared totally, while others have appeared which we never ſaw before. From theſe obſervations, and ſome other phenomena which paſs in the Heavens, he concludes, that at the end of a certain time the opaque globes become luminous, while thoſe laſt become dark, and entirely loſe their light; that both are not regular in this ſtate of change; that by the exhauſtion and extinction of the ſpirit of life, with which they are impregnated, theſe globes which are become opaque, are enflamed and ſet on fire a-new; that the new luminous globes, when the matter which ſerved as aliment to them is totally conſumed, fall

into their primitive obſcurity, and that this continual circle of revolutions is formed and renewed perpetually in the vaſt immenſity of manner.

SUCH are the principles which TELLIAMED has laid down and explained in the five firſt diſcourſes of this work. He might have ſtopped here, and ought to have done ſo. His ſyſtem by no means obliged him to explain, how in the paſſage from light to obſcurity, men and animals might be renewed in the ſeveral globes of the univerſe. He had acted wiſely, in referring theſe things to the ſupreme intelligence, who governs all. But the itch of reaſoning, ſo common among philoſophers, has not permitted him to confine himſelf within juſt bounds; and in order to puſh his ſyſtem as far as it would go, he has carried things too far.—This is the ſubject of the ſixth and laſt converſation, which is as ſingular, and as much an original as the others. In it TELLIAMED follows the ſame method, ſupporting himſelf much more upon the ſtrength of facts, than the ſubtilty of reaſoning.—It will no doubt appear very ſingular, to find men and animals coming out of the ſea; but the *Indian* philoſopher has only propoſed this as an hypotheſis. We muſt however grant, that he proves beyond contradiction, that the paſſage of any animal which lives in the water, to reſpiration in the air, is not ſo impoſſible, as is commonly believed; that reſpiration become neceſſary to animals come out of the ſea, is not a ſufficient reaſon to reject this opinion; that it ſeems founded on a great number of facts which cannot be eaſily denied, and which can hardly be explained on the ordinary hypotheſis. Be this as it will, we have reaſon to believe, that many of the learned will find the whole ſyſtem of the *Indian* philoſopher ſufficiently curious and ſingular to deſerve their attention.

The case is not the same with another class of persons, to whom this idea of novelty and singularity will perhaps appear a just reason for condemning the work; I mean those persons remarkable for their excessive scruples and delicacies in point of religion. I grant indeed, we cannot too much respect this delicacy, when it is enlightened and guided by reason; but it is equally certain, that this excessive zeal sometimes only proceeds from ignorance and meanness of spirit, since it often degenerates into false prejudices, and a barbarous and ridiculous blindness* ; that without giving a shock to religion, we may boldly attack ill-grounded scruples, which are only the effects of an inexcusable superstition; and that if we are obliged to support the pure and salutary ideas of the former, we are equally bound to oppose the propagation of the stupid opinions set on foot by the latter; for it is hardly credible, how subtil error is to insinuate itself into the minds of men, how powerful it is to establish itself there, after it has taken possession, and to maintain itself, how dextrous to grasp at every thing which can favour the empire it has usurped†. Can we therefore be surprized, that it should cover itself with a cloak of religion, than which nothing is more venerable.

Be this as it will, these persons are the more troublesome, because "though we can give them

* *Superstitio fusa per gentes oppressit omnium fere animos, atque hominum imbecillitatem occupavit. Nec vero, superstitione tollenda, religio tollitur. Quamobrem, ut religio propaganda etiam est, quæ est conjuncta cum cognitione naturæ, sic superstitionis stirpes omnes elidendæ sunt; instat enim & urget, & quocumque te verteris persequitur.*

Cic. de Divin. Lib. 2.

† *Errors once established among men, generally spread deep and wide roots, and cling about every thing which support them.* Fontenelle's Origin of Fables.

" very good reaſons, yet they have a privilege not " to yield to the beſt reaſons if they do not like " them*." Now it is hardly to be doubted, but that upon the firſt appearance they will imagine there is ſomething dangerous to religion in the ſyſtem of the *Indian* philoſopher, and that upon this account they will treat it as impious, atheiſtical and abominable. We might anſwer them in general, that we ought not to condemn ſlightly, and that if we were to found our judgment upon appearances, or upon conſequences often very remote, there would be few chriſtian ſchools, and even few ancient fathers of the church, who ſhould be ſcreened from cenſure. But the graver the accuſation is, the more it deſerves a formal anſwer.— Let us therefore fairly, and without prejudice, examine, whether inſtead of being oppoſite to religion, the ſyſtem of *Telliamed* is not on the contrary highly conformable to the moſt juſt and ſalutary ideas, which religion gives us of the deity.

Let us therefore ſeparate from this ſyſtem every thing which is foreign to it. Of this kind are the eternity of matter, *ab ante*, and the origin of man, ſuch as our *Indian* has repreſented it. It is evident, that he only propoſes both as hypotheſis, and we cannot be offended at his taking this liberty, ſince it is authoriſed by the conſtant practice of all the ſchools. The eternity of matter, though ſupported by ſome of the ancient philoſophers, is an opinion ſo abſurd, that in an age ſo knowing as ours, it is ſurpriſing that men who want to be tho't bright geniuſes, ſhould be the abettors of it.— With reſpect to the origin of man, what our philoſopher has ſaid of it in this treatiſe, is no more than a conjecture formed by a warm imagination, and can never make any impreſſion on the mind

* *Preface to the plurality of worlds.*

of the reader. As to the deluge, it is needleſs here to enter into the celebrated controverſy, whether it has been really univerſal, and whether the words of *Geneſis* ought to be underſtood of an inundation truly general, and which covered the whole earth. *Telliamed* in ſome paſſages ſeems to deny this, but proteſts that it is indifferent to him which ever ſide of the queſtion the reader eſpouſes. And in a word, we find that the ſentiments he has produced againſt the univerſality of the deluge, only terminate in ſome doubts; that if on theſe different ſubjects he propoſes certain notions and reaſonings, which ſeem to oppoſe revealed religion, he only does it to ſhew, that there is no object about which the human reaſon may not form either very great difficulties, or very probable ſyſtems, and that there are doctrines certainly true, which it combats with almoſt unanſwerable objections.— Beſides, it is to be remembered, that even in ſchools, we make a great difference between conteſting a received doctrine, and conteſting ſome reaſons alledged to prove that it ought to be ſo.— Natural equity therefore demands that we ſhould pardon our *Indian* philoſopher on theſe three points, ſince in handling them, he has not pretended to eſtabliſh a particular ſentiment, and has never paſſed the bounds obſerved by the moſt ſanguine defenders of orthodoxy, who have always claimed a right of examining the reaſons uſed to defend the truths of religion, or to refute the oppoſite ſentiments.

Let us now proceed to thoſe opinions, which our philoſopher has either eſtabliſhed or ſuppoſed in this treatiſe, though they are not peculiar to himſelf. Of this kind are the plurality of globes, inhabited by creatures of our ſpecies, which is the baſis of the fifth converſation; and the ſpecies of future eternity aſcribed to theſe globes in the ſame

paſſage. But I am not of opinion that what *Telliamed* has ſaid on this ſubject, can be any juſt reaſon to ſuſpect his religion. Not to mention *Cyrano*, known for his imaginary voyages into the ſun and moon, the author of the ingenious *converſations of the plurality of worlds*, has not been blamed for his ingenious raillery: And though we find a great deal of oſtentation, and little ſolidity, in the works which *Huygens* compoſed on the ſame ſubject, yet he was far from being treated as an impious man, and an atheiſt, on that account. It has in our own days been ſhewn*, that this ſentiment is by no means new, that it was known in the firſt ages of chriſtianity; that though this opinion has been attributed to ſome heretics†, and though an author in the fourth century ranks it amongſt the number of hereſies‡, yet it has been ſuſtained, at leaſt as a poſſibility‖, in a work compoſed expreſsly againſt *Pagans*, by one of the moſt ancient and venerable fathers of the church.

We may ſay the ſame of the future eternity of our globe, or rather of this univerſe. It is evident, that the ſcripture, which teaches us that this world muſt one day have an end, no where informs us that it is to be annihilated; that even in

* *Memoirs of literature, Tom.* 9. *Diſſertation entitled,* ſentiments of the ancient philoſophers on the plurality of worlds.

† Iræneus *attributes it to the* Valentinians. *Adverſ. Hæreſ. Lib.* 2.

‡ *Philaſtres* biſhop of *Breſce.* Hæreſ. 65. Tom. 2. Bibl. P. P.

‖ *Nec enim quia unus eſt Creator, idcirco unus eſt mundus; poterat enim Deus, et alios mundos facere.*
Athan. contra Gentes.

several passages it formally indicates the contrary; * that the primitive christians had been of this last opinion, and universally believed, that the general conflagration would only purify this world, without annihilating its matter; that the most celebrated fathers of the church, such as *Origen* and *Augustin*,† thought the same. Shall we therefore condemn in a philosopher, what we ought to respect in the defenders of the faith?

Of all the system then of Telliamed, there are only two points on which perhaps any accusation may be formed against him, I mean the origin of our earth, such as he establishes it, and the perpetuity of motion, which he admits in the other globes; for when we tell you that this globe which we inhabit is the work of the sea, if you reason but a little, you at once judge, that in order to admit this proposition, you must renounce the history of the creation, such as we read it in *Genesis;* and if you take one step farther, you think yourself obliged to acknowledge the pre-existence of matter.—This holds true of that eternal circulation of changes, by means of which our philosopher pre-

* For behold I create new heavens, and a new earth, and the former shall not be remembered nor come into mind—*Isa.* lxv. 17. And I saw a new heaven and a new earth, and the first heaven and the first earth were passed away; and there was no more sea—*Rev.* xxi. 1. Nevertheless, we according to his promise look for new heavens, and a new earth, wherein dwelleth righteousness—2 *Pet.* iii. 13.

† *Si mutabuntur cœli, utique non perit quod mutatur; & si habitus mundi transit non omni modo, exterminatio, vel perditio substantiæ materialis ostenditur: Sed immutatio quædam sit qualitatis, atque habitus transformatio*—Origen de Princ. Lib. 1. cap. 6. *In litteris quidem legitur, preterit figura hujus mundi; legitur mundus transit; legitur cœlum & terra transibunt; sed puto quod præterit, transit, transibunt, aliquanto mitius dicta sunt quam peribunt*—August. de civitat. Dei, lib. 2. cap. 24.

tends to ſhew, that the ſtate of the univerſe may perpetuate itſelf. The reader may at firſt imagine, that this principle has a tendency to oppoſe the actual concurrence of a ſupreme and intelligent cauſe, and conſequently to deſtroy providence*. Let us therefore enquire what we ought to think of theſe conſequences; by reducing things to their juſt value, perhaps we ſhall find that the diſadvantageous idea, which people may entertain of this work, is at bottom no more than a bugbear, and a phantom, only capable of terrifying prepoſſeſſed imaginations.

LET us begin with the origin of our globe. It is at firſt viſible, that the opinion of pre-exiſtence of matter, as it is explained or ſuppoſed in this treatiſe, gives no ſhock to the omnipotence of the creator, and the gratitude due to him from the creature, for the being he has conferred on it: For whether the creation of matter has, or has not, for many ages preceded the actual arrangement of this univerſe which TELLIAMED ſuppoſes in his ſyſtem, God will for this be neither the leſs powerful and glorious, nor leſs the author and creator of all things.

IT is true, this ſentiment is not generally received; becauſe it is oppoſite to the common belief, that the univerſe was produced from nothing in the ſame ſtate in which we ſee it; and becauſe it ſeems to combat what the ſcriptures teach us concerning the origin of the world. But we know that *Vatablius*, *Grotius*, and other learned men, have maintained, that in order to give the true ſenſe of the firſt verſe of *Geneſis*, it ought to be tranſlated,

* This is what *Clemens Alexandrinus* found fault with in the Vortices of *Anaxagoras*.

Stromat. lib. 2. cap. 4.

when God created the heavens and the earth, matter was without form, which clearly eſtabliſhes the pre-exiſtence of matter. If this opinion is not true, it may at leaſt be looked upon as probable, and we muſt grant, that a ſimple probability is ſufficient to lay a foundation for a philoſophical ſyſtem. It would be eaſy to ſhew, that if the ſyſtem of TELLIAMED concerning the origin of the earth, is not entirely conformable to the Moſaic hiſtory of the creation, yet it is not abſolutely contrary to it.

WHAT means that maſs in the beginning without ſhape and form, that darkneſs ſpread upon the face of the deep; the ſpirit of God moving upon the face of the waters, and that ſeparation of the waters from the waters, mentioned in *Geneſis?* What other ideas do theſe expreſſions naturally convey to the mind, than thoſe which our philoſopher gives us, when he repreſents this globe to be buried at firſt under the waters of the ſea, which animated by that ſpirit of life with which the creator had impregnated them, formed our grounds and our mountains in their boſom. Theſe waters afterwards diminiſhed in the manner explained by TELLIAMED, their ſurface ſubſided, and our higheſt mountains beginning to ſhew their tops above the waves, the earth as yet barren, ſoon gave the firſt marks of her fertility: Then ſhe began to be clothed with herbs, and the verdant paſturage, neceſſary for the nouriſhment of the animals with which ſhe was afterwards ſtocked. Man was the laſt work of the hand of God, and in all theſe reſpects, ſcripture and the philoſophy of our *Indian*, preſent our minds with the ſame images.

IT may perhaps be ſaid, that ſince in *Geneſis*, the word *day* is uſed to denote the time in which God produced the works of creation, we ought by a

neceſſary conſequence to believe, that they were accompliſhed in the ſpace of ſix days, or of ſix revolutions of the globe round its center. But it is evident from *Geneſis* itſelf, that the ſun was not created till the fourth day, and that conſequently before that time, we could neither count days nor nights; whence we may conclude, that the word *day* is in that part uſed improperly, metaphorically, and to ſignify the ſucceſſion with which the ſupreme intelligence executed the different works there mentioned. Beſides, the longeſt or the ſhorteſt meaſure of time which this formation of the univerſe coſt him, is by no means capable of taking from, or adding to his power; God would not have been greater, though he had produced the world in an inſtant, or to uſe the ſcripture expreſſion by a *let it be*. Thus neither the ſix days in which, according to *Geneſis*, he laboured at his production, nor a longer ſpace of time, ſuch as we imagine, according to the ſyſtem of Telliamed, nor what the ſcripture ſays concerning his reſting on the ſeventh day, as if he had been fatigued by his labour, in the leaſt diminiſh his glory. There is no time in him; the paſt and the future are in him indiviſible; and if *Moſes* has ſaid, that he employed ſix days to create the heavens, the earth, and all that they contain, it is perhaps a method of ſpeaking which he uſed, to inform us that all theſe things were made ſucceſſively.

With reſpect to providence, we want to know what we ought to underſtand by that term; and whether a work compoſed with ſo much wiſdom and art, that without retouching it, its very deſtruction ſhould prove the principle of its renovation, would not be an infallible mark of a wiſdom much more perfect, powerful, and attentive to the good of thoſe for whom this work was formed,

than if at every inſtant the artificer was obliged to put his hand to it? What compariſon could we make between a clock-maker, who had ſkill enough to make a clock ſo curiouſly, that by the diſorder which time ſhould produce on her parts and movements, there ſhould be new wheels and ſprings formed out of the pieces, which had been worn and broken; and another artiſt of the ſame profeſſion, whoſe work ſhould every day, every hour, and minute, require his attention to rectify its errors, and eternal variations?

PERMIT me to uſe this compariſon, which in the preſent caſe, I confeſs has no foundation, except in the narrow limits of our underſtanding and ideas: This is preciſely the caſe which remains to be determined between TELLIAMED and his oppoſers.

THESE repreſent the creator under the idea of a bungling and unſkilful artificer, whoſe work is ſo ſlight and unjuſt, that its total ruin is every moment expected. The workman in vain puts his hand to it, and employs all his pains to rectify its faults. After a conſtant and aſſiduous application, after reiterated attempts which coſt him no leſs labour than the original production, he is no farther advanced than he was the firſt day; and he will always have his toil to begin, till he deſtroys the ſorry work of ſo much care and pains. I defy the moſt moderate abettors of the divine concurrence to ſay, that I have exaggerated this deſcription of their opinion. Do they not maintain, that to every action of the creature, whatever it is, the intervention of the general cauſe is abſolutely neceſſary, and that every inſtant of preſervation is a new creation? As others have ſufficiently ſhewn the terrible conſequences ariſing from this ſyſtem, I ſhall not here touch upon them.

The *Indian* philoſopher preſents us with a quite different image of the Deity. He deſcribes him under the idea of a ſkilful artiſt, infinitely maſter of his buſineſs, who in the production of his work, employs all the means proper to render it durable, uſeful, and beautiful. Time which conſumes all things, and the nature of human affairs, always ſubject to viciſſitudes, in vain attempt a change in his maſter-piece; they cannot produce its deſtruction. Theſe very diſorders which he foreſaw muſt happen, will contribute to its preſervation. It will perpetuate itſelf by the ſame means, which in other works prove the principles of their ruin; and from the boſom of its own wrecks, it will ariſe as perfect and beautiful, as it appeared on its firſt formation.

Now of theſe two repreſentations, which gives us the moſt noble, ſublime, and exalted idea of the Deity? What is more proper to excite our gratitude and love, than to ſee him ſo far concerned for our tranquility, as to prevent our dread, leſt his works, abandoned by his powerful hand, ſhould one day return to that chaos whence his goodneſs drew them for our ſakes? What more glorious for God, than to have ſo formed the world, which we inhabit, that in preſerving always, nearly the ſame number of opaque and luminous globes, the deſtruction of ſome ſhould contribute to the renovation of others, without being obliged to produce new ones? What more worthy of the Creator, than to have eſtabliſhed ſuch an order in the nature of the univerſe, that it ſhould carry in itſelf the principles both of its life and death; that animated with that ſpirit of life, with which he has impregnated it, it ſhould be in its infancy the author of all thoſe productions which were either uſeful or neceſſary to the ſubſiſtence of the creatures,

deſtined to inhabit it; that it afterwards ſhould wax old, by the weakening of this ſame ſpirit; that it ſhall be ſet on fire by the extinction of this ſpirit —and by its return, like the *Phœnix* riſe out of its own aſhes? If nature always uſes the beſt economy in producing the greateſt deſigns*, how can we think to honor the author of nature, by ſubjecting him to ſo painful and continual attentions, to a deſign of ſo ſmall importance to him, as the preſervation of this univerſe?

It may, perhaps, be ſaid, that this principle tends to eſtabliſh the idle deity of *Epicurus*; and, in order to render the opinion of *Telliamed* odious, people will not fail in imitation of *Cicero*, to draw a ridiculous picture of this divinity. Hence people will conclude, like him, that to imagine a God like this, is, in effect, to acknowledge none at all. We might anſwer, that to conſult even the *Roman* orator in the compariſon, the inſenſible idol of the *Epicureans*, was, perhaps, far more valuable than the reſtleſs active deity, to whom the *Stoics* gave ſo many occupations ſo highly below him.— But we have at preſent no buſineſs either with the *Stoics* or *Epicureans*. It is ſufficient to have ſhewn, that the ſentiment of *Telliamed*, is ſo far from ſtriking at the wiſdom, the goodneſs, and the omnipotence of God, that it is on the contrary infinitely favourable to theſe divine attributes, which both reaſon and ſcripture oblige us to acknowledge in the Supreme Being.

We certainly cannot eaſily force our philoſopher to grant, that God is continually employed in the preſervation of the univerſe, and that he is ſo ſtrongly attached to this work, that at every

* *Dialogues on the plurality of worlds*, 1 Evening.

moment it is requiſite for him to uſe the utmoſt efforts of his power to ſuſtain it. Beſides, he will readily acknowledge, that the work of preſervation, is truly the work of the hand of God; that nothing happens in the world without his permiſſion, and in conformity to his eternal decrees; and that among all the ſecond cauſes, there is not one which is not ſubordinate to his omnipotent will. The defenders of the actual divine concurrence will not be content with this conceſſion.—But is not this, perhaps, as much a fault in their manner of thinking, as in that of our philoſopher? Can they refuſe to grant, that the operations of God do by no means reſemble any thing that is ſuggeſted by our weak and ſhallow ideas? And upon this principle, is it not evident, that they attribute to the Deity a providence no more than purely human, and bounded by hours and moments, ſuch as we may conceive in a wiſe man? Is not a providence, thus limited and imperfect, a providence, the end of which is nothing elſe than to make God the author of ſin, and to ſap the foundations of morality,‡ infinitely unworthy of a ſovereignly perfect being? Can we more effectually honor this Supreme intelligence, than in diſengaging him from the ſlavery to which theſe baſe and ſervile ideas ſeem to reduce him?

If, however, there ſhould remain any ſcruples with reſpect to theſe points, every one is at liberty to look upon what *Telliamed* has wrote on them as the *diverſion of his mind, founded on conjectures*, on ſome phænomena, or on conſequences very remote from the ſolidity of the proofs, which he advances for the diminution of the ſea. The pro-

‡ This is what the diſciples of *Deſcartes* and *Malbranche* are upbraided with.

teſtations he frequently makes of his having no mind to take any part in theſe differences, but only to ſuſtain his ſentiment as a pure hypothesis, leave us no room to doubt of the rectitude of his intentions, and of the little diſpoſition he had to appear a dogmatiſt. We ought therefore to read his two laſt conferences, with the ſame turn of mind, that we read the agreeable reveries of *Cyrano*, and the ingenious fictions contained in the diſcourſes on the plurality of worlds. No body ever upbraided theſe authors on account of what they wrote, and *Telliamed* expects the ſame indulgence from his readers.

This is what I had to ſay in defence of our *Indian* philoſopher, without pretending to be his diſciple, or to juſtify him; and I proteſt that I only look upon his ſyſtem, as well as the other ſyſtems of ancient and modern philoſophers, to be an ingenious chimera. I ſhall add one reflection, which cannot fail to make an impreſſion on the minds of wiſe men. When the philoſophy of *Deſcartes* appeared, what outcries were made againſt his doctrine? The moſt hot and zealous aſſerted, that it had tendency to nothing leſs than the deſtruction of religion, the very foundations of which it ſapped. However, this ſo dangerous ſyſtem was afterwards adopted and maintained, at leaſt in part, through all the moſt orthodox chriſtian ſchools.—Why ſo? Becauſe in the judgment of prepoſſeſſed and ignorant people, it is ſufficient for a doctrine to have an air of novelty, to be judged pernicious. Time wears off this falſe impreſſion, and it becomes leſs ſuſpected in proportion as it grows older, or rather as it begins to be better known.—Let me add, that in our days we know better than ever, the extreme difference there is between the doctrines of faith and ideas purely human. In a

word, it is now generally granted, that religion and philoſophy have rights very diſtinct, and a manner of reaſoning peculiar to each of them; that the one is ſuperior to nature, whoſe laws God may reverſe at his pleaſure; and that the other is the ſcience of nature herſelf, whoſe laws God has permitted us to trace and inveſtigate; that faith is above reaſon; and that on the contrary, *reaſon* is the *candle* which ought to light us to all natural knowledge.

Upon this principle let the reader look upon *Telliamed*, as a philoſopher who has by no means attempted to compoſe a treatiſe of theology. Let him therefore be permitted to reaſon like a philoſopher; and let us in his diſcourſes only ſeek for ſyſtems purely philoſophical. Let thoſe who want to inſtruct themſelves in their religion, conſult the many excellent works, in all ages wrote in its defence. As for the *Indian* philoſopher he here proteſts, that he only pretends to intereſt reaſon in his ſyſtem, and that, if people do him juſtice, they can only attack him by the light of reaſon.

Cum de religione agitur, T. Coruncanium, P. Scipionem, P. Scævolam, pontifices maximos, non Zenonem, aut Cleanthem, aut Chryſippum ſequor; habeoque C. Lælium augurem, eundem ſapientem. quem potius audiam de religione dicentem in illa oratione, quam quemquam principem Stoicorum; mihi unum ſatis erat, ita nobis majores noſtros tradidiſſe. Sed tu auctoritates omnes contemnis; ratione pugnas, patere igitur rationem meam, cum tua ratione contendere.

Cic. de Nat. Deor. l. 3.

PLAN

OF

Telliamed's System.

FIRST DAY.

PROOFS *of the diminution of the sea.*
Foundation and origin of this system.
Aquatic Lanthorn of a singular invention.
Principles of this system.
Proofs of this system by the disposition of our grounds.
——*By their composition.*
——*By the sea bodies found in them.*
——*By their external form and appearance.*
New proofs of this system.
Petrification of flints.
Variegated stones and marbles.
Rock and gravel stones.
Waved marbles.
Our large mountains.
Primitive state of our globe.
Reason of the difference observable in the substance of our mountains.

SECOND DAY.

SEQUEL of the same doctrine proved by facts.
Extraneous bodies found in stones and marbles.

Ships, and parts of ſhips, petrified.
Flints, ſea flints, and ſtones of a different colour.
Herbs and plants.
Sea-bodies diſperſed in all parts of the globe.
Mountains of ſhells, corals, &c.
Small muſhrooms.
Banks of oyſter-ſhells.
Whether theſe facts can be attributed to the deluge.
Towns of Lybia buried under the ſand.
Future conſequences of the diminution of the ſea.
How our grounds began to appear.
The actual enlargement of our dry land.
Examples of this enlargement.

THIRD DAY.

NEW proofs of the diminution of the ſea.
Eſtimation of this diminution.
The waters of the ſea are not diminiſhed by a change of place.
They have not retired into the centre of the globe.
The cauſe of their diminution is not an effervescence.
Defect of our hiſtories.
Invention to aſcertain the progreſs of the diminution of the ſea.
Ancient examples of menſurations of this kind.
Eſtimation of this diminution.
Difficulty of fixing it.

FOURTH DAY.

EXAMINATION of the different ſyſtems concerning the origin and nature of the ſea-bodies found in our mountains.
Syſtem concerning the origin of our mountains, and its refutation.
Anſwer to ſome difficulties drawn from this ſyſtem.
Diſſertation of Scilla *on the ſame ſubject.*

Sea-bodies found in the earth, are not the effects of chance.
Anſwer to ſome objections made upon this ſubject.
New proofs from Scilla.
Sentiment of Langius, *and its refutation.*
Sentiment of Omar.
Laſt proofs of the diminution of the ſea.
Recapitulation of the proofs of this ſyſtem.
Uſe that may be made of it.

FIFTH DAY.

CAUSES of the diminution of the ſea; conſequences of this ſyſtem, with reſpect to the paſt, preſent, and future ſtate of the univerſe.
Whether matter and motion are eternal.
Syſtem of the general motion of the globes.
Alterations and viciſſitudes to which they are ſubject.
Reaſon of the inequality of the days, and of the viciſſitudes of the ſeaſons.
Changes which have happened in the ſtate of the heavens.
The nature of the ſun.
The appearance of comets.
The entrance of our earth into the vortex of the ſun.
The great age of the primitive men.
Renovation of the globes.
Origin of Vulcanos.
Uncertainty of the future fate of our earth.
The ſtate of the fixed ſtars.
Refutation of Huygens's *ſyſtem concerning the plurality of worlds.*
Various thoughts on the ſame ſubject.

SIXTH DAY.

OF the origin of men and animals, and of the propa-

gations of the various ſpecies by means of their reſpective ſeeds.
Terreſtrial plants that grow in the ſea.
The origin of animals.
Their reſemblance to certain fiſhes.
Eaſineſs of the paſſage from water to the air.
Birds.
Terreſtrial animals.
Phocaſes, or ſea-calves.
Sea-dogs, or wolves.
The origin of man.
Sea-man.
Savage, or wild men.
Men with tails.
Men without beards.
Men with one leg, and one hand.
Blacks.
Giants.
Dwarfs.
The paſſage of men from the water into the air.
Anſwer to ſome objections on this ſubject.
Tradition of the Chilineſe.
An animal may paſs from the reſpiration of the water to that of the air, and from the latter to the former.
Anſwer to ſome difficulties.
The propagation of the various ſpecies by their reſpective ſeeds.
How theſe ſeeds become fruitful.
Conformity of this ſyſtem with the book of Geneſis.

TELLIAMED;

OR, THE

WORLD EXPLAIN'D.

First Day.

PROOFS OF THE *DIMINUTION* OF THE *SEA.*

SIR,

SINCE you desire that I should *ENTERTAIN* you with the whimsical opinion of an INDIAN TRAVELLER, whom I saw at *Grand Cairo* a number of years ago—I shall grant your request, and perform my task as exactly as I possibly can. I have still so lively an idea of the remarkable things I learned of him, that I hope I shall not omit the least particular. This stranger reposed a great confidence in me, and thought he lay under singular obligations for some small services I did him in *Egypt*. He readily discloſed his mind to me, when some days before his departure for the *Indies*, I asked him concerning his country, his name, his family, his religion, and the motives which induced him to travel;—he accordingly spoke to me nearly in the following manner: —

Sir, I have always declined ſpeaking to you of my religion, becauſe it can be of no uſe to you, and becauſe all men being naturally prepoſſeſſed in favor of that in which they are born, it offends them to contradict the articles of it. For this reaſon, and by the advice of my deceaſed father, I have all my life avoided entering into this matter, that I might not give riſe to diſputes in which every man thinks it a point of honor and conſcience to ſupport his own opinion, and which never terminate but in mutual animoſities. For this reaſon, Sir, I hope you will pardon me for not ſatisfying your curioſity in this particular. I would not have even ſpoke my ſentiments to you, on the compoſition of the globe, the ſtudy of which is the cauſe of my travels, if I had not diſcerned in you, a ſoul capable of triumphing over the prejudices of birth and education, and above being provoked at the things I intend to communicate to you; perhaps they will at firſt appear to you oppoſite to what is contained in your ſacred books, yet I hope in the end to convince you that they are not really ſo. Philoſophers (permit me to claſs myſelf among that number, however unworthy of the name) rarely find theſe happy diſpoſitions; they have not even met with them in the ages and in the countries of liberty, where it has been often dangerous for ſome of them who have dared to ſpeak againſt the opinions of the vulgar. Beſides, continued our *Indian*, you have travelled a great deal, you have travelled through many maritime countries, you ſeem to think that the ſecrets of nature are not unworthy of your curioſity. You have learned to doubt, and every man who can do ſo, has a great advantage over him who believes implicitly, and without taking the trouble to examine. You there-

fore poſſeſs, Sir, the principal diſpoſitions neceſſary for reliſhing the obſervations I am about to make. This gives me reaſon to hope that you will yield to the evidence of the proofs I ſhall bring, for the ſupport of my ſyſtem.

As for my family, my name, and my conntry, what I can tell you is, that I am the ſon of a father who was far advanced in years when I was brought into the world ; as for my country, it is far diſtant from yours. My name, which you are curious to know, only from a principle of friendſhip to me and my ſon, is *Telliamed*. My father, who was bleſſed with the goods of fortune, was by my grandfather educated in the ſtudy of the ſciences, eſpecially of natural hiſtory, which he himſelf had greatly cultivated. My father took care to nouriſh in me the ſame inclination which he had received as hereditary from my grandfather, and to inſtruct me concerning the compoſition of this habitable globe, which was his own principal ſtudy. Such was his paternal affection, that notwithſtanding his age, he travelled along with me and aſſiſted my thoughts and meditations. Death, which cut him off too ſoon, did not permit him to perfect me in theſe ſublime branches of knowledge : However, the paſſion with which he had inſpired me for them, and the deſire of communicating them to my ſon, render me now, though advanced in years, a traveller through the world with him.

An obſervation which my grandfather made, and which he communicated to my father, was the cauſe of a courſe of ſtudy, which laſted all their lives, and which has been the principal occupation of mine. The houſe of my anceſtors, which I ſtill poſſeſs, is built on the ſea-ſide, at the point of

a very narrow but long peninſula. It is covered by a ſmall iſland, the whole of which is a hard rock perfectly horizontal with the ſea. My grandfather, as he aſſured my father, had in his youth obſerved, that in the greateſt calm, the ſea always remained above the rock, and covered it with water: Twenty-two years, however, before his death, the ſurface of this rock appeared dry and began to riſe.

This event ſurpriſed my grandfather, and made him entertain ſome doubts, concerning the generally eſtabliſhed opinion, that the ſea is not diminiſhed. He even thought that if there was any reality in this apparent diminution, it could only be the continuation of a preceding diminution, of which the grounds or ſoils higher than the ſea, would, no doubt bear or include in them the ſenſible marks. This idea engaged him to examine theſe grounds with more attention than he had done before. He accordingly found that there was no difference between the places far from the ſea, and theſe which were either near to it or ſtill waſhed by it; that they had the ſame aſpect, and that the former as well as the latter had ſea-ſhells adhering to, and inſerted in their ſurfaces. He found twenty kinds of petrifications which had no reſemblance to each other; ſome were deep, and others ſuperficial; ſome were of an uniform, and others of different ſubſtances. He obſerved quarries of free-ſtone, hard and ſoft, of various colours and different grains. He found other quarries of flint or of inlaid ſtones, white, black, greyiſh, and often of a whimſical aſſemblage of colours. Some of the quarries were marble, white, black—of the colour of agate, ſhaded and not ſhaded.

The origin of this ſo great variety of ſoils, joined to the *Strata* or beds ſo different in ſubſtance,

thickneſs and colour, of which moſt of theſe quarries were compoſed, ſtrangely perplexed his reaſon. On the one hand, if this globe had been created in an inſtant, in the ſame ſtate in which we ſee it, by the power of a will as efficacious as abſolute, he thought that its ſolid ſubſtance would have been compoſed of one ſingle matter; and eſpecially that it would not have been arranged in beds laid over each other with juſtneſs, even in their inequality of ſubſtance and colour. This denotes a ſucceſſive compoſition, which is alſo juſtified by the inſertion, of ſo many extraneous bodies, even ſuch as have had life, into thoſe beds. But if it had been neceſſary to have recourſe to another origin of our ſoils, though both within and without theſe petrifications he remarked almoſt infallible traces of the action of the ſea, how could he comprehend that it could have formed them, ſince it was now ſo far below them? How could he perſuade himſelf that it had drawn from its boſom, the different materials which he ſaw employed in the compoſition of theſe ſoils.

These reflections induced him to go to the ſea-ſide, to ſee whether in meditating on what happened there daily, it was poſſible for him to remove his doubts, and diſcover the true origin of the terreſtrial globe. He thought that as the literati, who were the ornaments of his time, were moſtly employed in vain and frivolous ſtudies, he might well employ his days in the reſearch of a ſubject ſo intereſting as the origin of thoſe ſoils or earths which carry us, of which our cities are built, and which ſupply our wants. With this view, he ſlowly wandered along the ſea-ſhore, ſometimes on foot, and at others in a light chaiſe, often very near, and ſometimes at a great diſtance, that he might have a greater extent of ground under his eyes, and be

able to obſerve the diſpoſition of a whole coaſt.—He ſtopped for ſeveral hours on one ſhore, and in a particular place obſerved (if I may ſo call it) the labour of the waves, which broke at his feet: the ſand and the flints which the billows brought along, as they were either calm or tempeſtuous. Sometimes he ſat down on the ſummit of a ſteep rock, which the ſea waſhed; and from thence, as well as the waves permitted him, he obſerved whatever was moſt remarkable.

His principal ſtudy at this time, was to diſcover the diſpoſition of ſubaquatic ſoils, the motion and the labour of the waves of the ſea. For this purpoſe he hired ſeveral ſkilful divers, whom he uſed when the depth of the water no longer permitted his eye to diſtinguiſh objects and the qualities of ſoils. Theſe divers had caps of cere-cloth and maſks; to the tops of theſe caps, which below were lined with a large quantity of cotton, and ſo cloſely tied about the neck that no water could enter, were tied long thongs of leather, by means of which they could dive into very deep places, and remain under the water for ſeveral hours—Each of them had a compaſs in his hand and a ſmall ſharp-pointed ſtick, with a ſtreamer at one end—By thruſting this ſtick into the bottom they perceived the force and direction of the current; they could alſo walk eaſily under water, when the bottom was not too ſoft. This my grandfather put in execution in the greateſt calm, far from the ſhore, and in places where it was poſſible to reach the bottom with the thongs. He repeated his experiments in the ſame place ſeveral times, and when oppoſite winds blew. By this means he knew whether there were any variations in the currents and in the different obſervations he had made on the ſame places.

As he desired to know the state of the seas where the divers could not go either by the thongs or the assistance of their breath, he invented a machine, which succeeded with him to the greatest perfection. It gave him an opportunity of continuing his discoveries even in the deepest places where no sound could reach. This invention is so singular, that it deserves a description.

Of a very light but strong and thick wood, he ordered casks to be made, narrow at the bottom, one of whose extremities terminated like the apex or top of a sugar-loaf. These lanthorns, seven or eight feet in height, and about the middle three or four wide, had eight apertures. The four least made at equal distances, and disposed severally as high as the eyes of a man when he stood upright in the lanthorn, were exactly closed by sashes and crystal glasses. The four others, a foot and a half broad and three feet long, cut below the others, were closed up by tough and thin leather pasted and nailed to the outside of the wood, so that the water could enter into none of the apertures.—— The first mentioned holes were designed to facilitate the diver's power of considering all the bottom which surrounded him, when he dived with this lanthorn. The others, by the air always mixed with the water, and transpiring through the leather which closed them, served to refresh the person contained in the lanthorn, and render respiration easy. These skins being gently stretched, had also another use, which was to yield to the double motion of this respiration; and to follow that of another leather, nailed in form of a purse, to the inner side of the bottom of the lanthorn, when the diver wanted to push it outwards.

To underſtand this the better, imagine to yourſelf that in the thickneſs of the wood of which the bottom was made, and which was two inches thick, there was an aperture made a foot and a half in diameter, covered externally by a plate of iron, nailed to the wood, and internally to this leather in form of a purſe: betwixt the iron and the leather, was introduced into the aperture a foot and a half ſquare, a piece of wood exactly fitted to it, and of the ſame thickneſs with the bottom. This piece of wood was ſuſpended in the cavity which it fitted, at the diſtance of an inch from the plate of iron, by means of a ſpring tied to it at one of the ends, and at the other, nailed to the wood of the bottom. The toughneſs of the leather, with which it was covered internally, and the largeneſs of the ſquare, permitted this elevation. By this means the piece of wood had a ſpring; for in proportion as it was preſſed, it was depreſſed into its aperture as far as the plate to which it correſponded; and it roſe an inch and more as ſoon as the preſſure ceaſed, which produced the ſame effect in the pieces of leather nailed to the ſides of the lanthorn.

In the middle of this piece of wood, was made a long notch an inch broad correſponding to a ſimilar one in the plate of iron nailed upon the outſide of the aperture; the notch in the plate was deſigned to admit a piece of iron, furniſhed with beards on its ſides, like thoſe with which padlocks are ſhut. The notch made in the wood, a little narrower by ſome lines, ſerved to catch theſe beards, and diſengage them from the edges of the plate.

To this bearded iron was tied a rope of ſome fathoms length, and which had its other end fixed to a ball of ſtone. When the lanthorn was to be

uſed, after putting the diver into it, this ball of ſtone, deſtined to aſſiſt its deſcent, was fixed to its lower end, by introducing the bearded iron into the aperture made in the plate. By this diſpoſition, when the diver wanted to return from the bottom of the ſea, he had nothing to do, but with his foot to preſs the piece of wood contained in the purſe of leather. Upon this the beards of the iron fixed in the plate, being re-united to their common trunk, gave the lanthorn, diſengaged, from its weight, and become much lighter than the column of water it occupied, a full liberty of remounting to the ſurface.

To keep this lanthorn upright in its aſcent, as the weight of the ball of ſtone did its deſcent; there were tied to the lower end of the lanthorn two other ropes, furniſhed with leads of five or ſix pounds weight. Theſe ropes were longer by a fathom, than that to which the ball of ſtone was fixed. The ſuperior end of the lanthorn was furniſhed with a large piece of cork, terminating in a point, and fixed to the lanthorn by a bar of iron running through it. At the top of this bar was a ring, through which a rope paſſed, in order to ſuſpend the lanthorn by the yard or maſt of a ſhip, when it was to be put into the ſea. In this condition, after having introduced the diver, it was let down into the water as far as the cork. Here it was kept for ſome time, to give the diver an opportunity of preparing himſelf, and of knowing whether the lanthorn leaked; and as ſoon as he made a ſignal that every thing was in order, the lanthorn was let down, either by cutting the rope, or letting it ſlip through the ring.

Upon this, ſays our philoſopher, who had his eyes fixed on mine, I ſee you have an ardent de-

ſire to know whether, on theſe occaſions, our divers have ever been expoſed to danger from ſea-monſters, or whether they have not ſeen ſome of them of an extraordinary form. Fiſhes, continued he, are rare in ſeas that are deep, and far from land which furniſhes them with nouriſhment. The divers have indeed frequently met with animals, creeping or walking in the bottom of the ſea, of a form approaching to that of animals, which creep or walk in the earth. If any fiſhes were in their way, they got off ſpeedily, being no doubt, aſtoniſhed to ſee in the abyſs which they inhabited, ſo great a prodigy, and to hear the noiſe of ſome bells tied to the lanthorn, which were continually moved by the air in its deſcent and aſcent.

My grandfather inſtantly marked down what the divers had diſcovered, as well as the quality and colour of the ſlime, which the leads brought from the bottom. He was not even afraid ſometimes to deſcend in perſon into the ſea, in order to inform himſelf by his own eyes, with reſpect to ſome remaining doubts, or extraordinary things, with which the divers could not acquaint him. By theſe reſearches and experiments, which he made in the bottom of the ſea, he formed charts, eſpecially when the diſcoveries were made near the coaſts; and upon theſe charts, the force and direction of the currents were exactly marked. The divers knew theſe currents, by means of a red or green ribbon, a yard or two long, which was tied to the top of the lanthorn, and which the currents moved more or leſs, according as they were ſtronger or weaker.

After this labour, my grandfather compared the ſtate of the bottom of the ſea, with that of the land which correſponded to it, in order to know

the relation there was between them, either in their conformation, or between the currents, and the winds moſt common on the neighbouring coaſts, of which he took great care to inform himſelf.—He alſo obſerved, whether in the bottom of the ſea there were cavities correſponding to the gulphs of the neighbouring grounds, or on the contrary, elevations, in conſequence of capes, which almoſt always happened. He continued long on the iſles and rocks of the coaſts, which he viſited; and thence he conſidered at leiſure, what happened during the tempeſt and the calm, not only on the ſhore where he was, but alſo on that of the adjacent continent His deſign was the better to judge by the labour of the ſea, whether ſhe had really formed theſe different ſoils, which only ſeemed to have been raiſed as barriers for her. In this ſtudy, he employed near two years, during which, to the eaſt and weſt of his own houſe, he viſited an hundred and fifty miles of the coaſt, and made experiments on the bottom of the neighbouring ſeas; and from theſe laborious reſearches he made the following obſervations.

That the ſea contained currents almoſt in all its extent; that ſome of theſe were general, that is, conſiderable, going from one part of the globe to another: For example, from the north to the ſouth, from the eaſt to the weſt, or in contrary directions; that ſome were alternate, and returned on themſelves after a certain ſpace of time, like the flux and reflux of the ſea, eſpecially in the neighbourhood of coaſts, and in the great gulphs; that others were continual, and without any other variation than their greater or leſſer rapidity during their courſe—that ſome were proper to certain coaſts, and that they were aided or oppoſed ſometimes by winds, and ſometimes by a ſuperior ſea, favourable or oppoſite.

That when one current meets another directly oppoſite to it, which often happens, there is the ſame combat between them, as there is between the waters of a river, and thoſe of the ſea, when they oppoſe each other; that the ſame effect was alſo produced by them; that is, at the point of their junction there was a kind of bar or ridge compoſed of the ſubſtances which were in the currents; and heaps of ſand or mud accumulated, higher or harder in proportion to the largeneſs and force of the currents, and the deepneſs of the ſeas.

That there were alſo currents which croſſed each other; that the ſtrongeſt in this caſe, cut the weakeſt, whoſe courſe upon this terminates, ſtopping at its ſides the ſubſtances carried along in the other, which often forms a ridge of mountains, and ſometimes a double one, when ſome powerful and rapid current ſeparates the two oppoſite ones, and leaving them on its right and left, continues its road between their depoſited ſubſtances, as in a deep valley.

That the waters of the ſea, however clear they may appear, always contain ſome ſubſtances, which they take up in ſome places and loſe in others; that they collect theſe ſubſtances according to the rapidity of their currents, the diſpoſition of the bottom through which they paſs, or by accidents happening during their courſe.

That in paſſing through narrow places the currents undermine and carry off their ſubſtances with them, as we obſerve, that a river pent up between its banks, or which in its rapidity meets with a bottom which is ſhallow and ſoft, wears them away, and carries them along with it; that after having exhauſted the matter of certain beds or ſoils, which

they or other currents had formed, which they ſucceſſively carry off, they at laſt elſewhere form arrangements of theſe ſubſtances.

That when great tempeſts happened in the places whence theſe currents proceeded, or through which they paſſed, what they detached from certain parts of the bottom, the ſhells, and the fiſhes, which they either killed or bruiſed, the trees, the plants, the leaves of trees which the rivers and torrents had carried into the ſea, where theſe currents were, were all carried along by them, and depoſited partly in their courſe; when being leſs confined by the diſpoſition of the places through which they paſſed, they flowed but ſlowly in the places where they terminated. That in theſe laſt places, there were always heaps of ſand or mud, lying in the bottom of the ſea, which as yet covered them, or other ſimilar congeſtions which it no longer covered, ſuch as rocks, iſlands, banks, or continents, appearing at preſent on our globe.

That when theſe currents reach particular coaſts, they there find materials of another kind which they alſo employ in their different fabrications, according to the diverſity of ſubſtances, and the diſpoſition of the places where they arrange them.

That near the diſemboguements of rivers, brooks, and torrents, into the ſea, there are formed in the ſea, bars or beds, compoſed ſome of ſand, gravel, and flints; others of ſlime or mud, different in colour and quantity, according to the quality of the ſubſtances which the adjacent rivers brought along with them; that theſe ſmall mountains were more firm when only compoſed of ſlime or mud; that theſe laſt included a great many

herbs, which ſtopping on their ſurfaces, were afterwards covered by new ſlime added to the firſt; that by the ſoftneſs of their ſubſtance they were ſubject to be moved, and their beds expoſed to be diſordered or confounded, ſince after violent tempeſts, or the overflowing of adjacent rivers, the divers, and my grandfather himſelf, often found the former figures of theſe beds changed, made flat, or lengthened.

That on the ſhallow coaſts, the ſea threw every thing with which it met, as far on ſhore as it poſſibly could; that on coaſts covered by iſlands or rocks, which the ſea could break, in gulphs where there were rocks, whoſe wrecks fell into a ſandy bottom, where rivers and rapid torrents terminated, carrying with them ſtones, flints, gravel, and ſand, the ſea having received theſe, conveyed them to the ſhore, toſſed them, rubbed them a long time together, and by this means made them round; that the ſea at laſt placed them in ſuch a manner, that it's billows had no longer force to carry back with them the flints, to which the little water which remained, could only add ſome gravel and then ſome ſand; that this augmentation was not great, ſince after a very inconſiderable addition, the ſand remained dry, at firſt in calms, and then in every ſtate of the ſea.

That on the contrary, when coaſts were expoſed to a vaſt ſea, this ſea only brought on ſhore ſome ſhells, with ſand and mud, according to the ſubſtance of the bottom over which it rolls.

That at the foot of ſteep ſhores, there were new mountains formed, compoſed ſometimes of large and ſometimes of ſmall ſtones, according to the nature of the ſtones in theſe higher places,

which the injury of time broke, and which fell into the ſea; that among theſe great and ſmall ſtones there were often ſome of a different quality and colour, which had been brought by accident from other parts; and that theſe ſtones were united together by the mud or ſand, into which they had fallen, or that the waters of the ſea had ſince inſerted themſelves between them; that there were only extraneous bodies and ſtones found in theſe congeſtions, when the bottom of the ſea was ſandy; that on the contrary, we ſee ſcarcely any of them when the bottom is muddy, becauſe they are retained in their courſe, by the ſoftneſs of the ſlime in which they ſink.

That at the foot of ſteep rocks where the ſea is deep, the bottom is always muddy, ſince the waters being repelled by the rocks and returning on themſelves cannot convey any thing weighty thither; that this mud is tinged by the waters which fall from the mountains during the rains, and which retain the colour of the earth they have carried along, ſometimes yellow, ſometimes red, or of different colours, according to the impreſſion they receive from the nature of trees, from their leaves or fruit, from plants or herbs, and from all other bodies which theſe ſoils produce, and which either periſh in their boſoms, or are mixed with them.

That with reſpect to ſhores of ſtone or rocks which are not ſteep but rugged, and to which the ſea flows on a nearly ſimilar bottom, it daſhes on them almoſt always mildly, on account of the rocks which oppoſe its courſe, and break the force of its billows; that it then brings with it ſand, ſmall flints, various and numerous ſhells, an incredible deal of impurities and light bodies, which it

collects in passing over a rugged bottom; that with these substances it augments the rocks on the shore; that these are also augmented by the wrecks of the fish and shell-fish, which are found in those parts; and which adhering to the stones formed in these parts, live on the impurities which the sea brings along with her.

My grandfather had found in shallow places, and those where there were indurated rocks of sand covered with mud, certain shell-fish unknown or very rare on the coasts. Those whose fish were still alive, could hardly be torn from the rock; and those whose fish were dead, were so sunk in the mud, with which many of them were filled, that by these dispositions it was easy to know why they were never, or at least very rarely seen upon our shores.

After these different researches and experiments, nothing remained but to make the application of them to the present state of our soils, and to compare with their compositions, what passed in the sea or upon its shore. With this view my grandfather for some time visited the mountains near his own house and the coast, in order to discover more nearly the external appearance, and the disposition which he had before but viewed at a distance from the shore or from his boat used in his researches. He examined a long ridge of these mountains, stopping sometimes on their summits, sometimes on their declivities, and sometimes in the deepest vallies, that he might consider them in all directions and manners, often one after another, and sometimes altogether. In a word, after reiterated researches, he was persuaded their external appearance and their aspect did not differ in any thing from those of the elevations and vallies which

the ſea covered, and that they were arranged on the earth by the ſame means as thoſe which he ſaw in the ſea.

The direction of the beds which compoſed both, and perfectly correſponded to each other, and even the conformity of the ſubſtances of which theſe beds were formed, were to him a new demonſtration of his opinion. He had obſerved ſimilar beds formed in the ſea of depoſitions of ſand or mud, which were arranged on each other in a manner almoſt always horizontal; ſometimes however the direction of theſe beds varied, when by the diſpoſition of the bottom, the currents carrying theſe ſubſtances were forced to ſink or riſe againſt them, forming then their beds according to the winding of the ground, but always of an equal thickneſs. This he remarked moſt generally, eſpecially on the ſurfaces of high mountains. He found other mountains which were not formed by beds or ſtrata, and in theſe he diſcovered the collection of different ſubſtances, which he had ſeen formed in the ſea, near the diſemboguements of rivers and torrents, or at the foot of ſteep ſhores.

The prodigious number of ſea-ſhells of all kinds, cemented to the ſurface of both theſe concretions, from the ſea-ſhore to the higheſt of our mountains, as is obſervable on the coaſt and in the parts adjacent to it, was not a leſs convincing proof to him of their fabrication in the ſea, where theſe fiſh are produced, live and die. Conſiderable beds of oyſters which he found on ſome hills, others which appeared inſerted into the ſubſtance of the mountains; entire mountains of ſhells ſituated on the tops or ſides of other hills and vallies, which were covered with them to the height of ſeveral feet; an incredible number of ſea-ſhells coming out of

the ſubſtance of mountains which time had undermined, and many other ſea-bodies which every where appeared to him, repreſented a juſt image of what he had ſeen in the ſea itſelf.

He ſaw nothing in the whole external appearance of the mountains which did not convince him of the ſame truth. The marks of the attacks of the ſea in tempeſts, were deeply imprinted in a hundred ſteep places of theſe mountains; amphitheatres were formed by the action of the ſea: Steps under ſteps were produced on their ſides, according to the diminution of the ſea, which was there evidently marked. Corals which it had left adhering there, after it had given birth to them, and nouriſhed them in theſe places, where they were petrified. The holes of ſea-worms, which only live in the water, and which were found imprinted on many rocks, were to him convincing proofs of the real origin of our mountains, and of their ancient ſtate.

The high and the low, between which they are divided, were to him the laſt proof which did not permit him to doubt, but theſe mountains were the ſame work which the ſea performs every day in making roads through the ſlime and ſand, which ſhe raiſes at the junction of two currents, which are either oppoſite, or cut each other. Thus we ſee the waters of rivers, after having formed bars at their diſemboguements, compoſed of the ſubſtances they brought along with them, break through theſe bars, by beating them down in certain parts when they require a more free and open paſſage. There is, however, this difference between the collections of matter in the ſea, and theſe formed near the diſemboguement of rivers, that theſe laſt are not ſo indurated as not to be

ſubdued by the waters which firſt formed them.—The former, on the contrary, which are generated in the ſea, being petrified at the end of a certain time, ſubdue it. It is by this means, that it at preſent ſeems ſubjected to all theſe banks which have reſiſted it. However they ſtill retain the form of the paſſages, which the currents had made when their matter was ſoft, and which the flux and reflux of the ſea, had long entertained, whilſt as yet waſhing them, it ſometimes raiſed itſelf between the apertures which the waves had made, and afterwards left them. This is obſervable on the coaſts in a vaſt number of places, which differ in nothing with reſpect to their conformation, from thoſe which are already far diſtant from it.

After theſe general notions of the ſurface of our ſoils, and of ſome parts of their internal compoſition; which are obſervable in places which are either ſteep or undermined by torrents, my grandfather reſolved to make an exact diſſection of them, beginning at their ſurfaces, and paſſing to their deepeſt entrails. He began this new labour on the places moſt adjacent to his own houſe. I may ſay, on this occaſion, that as nature had placed a rock under his windows, of ſo particular a form that it ſeemed to have been made to teach men the inſenſible diminution which the ſea ſuffered every day, ſo the parts adjacent offered him ſo many other proofs of it, that it was natural to think, that all this could not be the effect of chance. It was, no doubt, the work of ſome happy genius, (if a philoſopher may be allowed to ſpeak ſo) who had made it his buſineſs to convince us in this ſhort method, of the manner in which this whole habitable globe was formed; as if, by this means he had intended to ſupply the remembrance of facts, or the writings which time had deſtroyed, and which could have inſtructed us concerning them.

In theſe different parts my grandfather found all kinds of petrifactions in the ſurfaces of the mountains; and theſe petrifactions were in places very diſtant from each other. One of the firſt which preſented was a compoſition of ſtones, flints, wood, and other ſubſtances; this is called a flint-bed, which is often of a conſiderable extent, but always ſhallow. He obſerved that this kind of petrifaction was rarely found except in ſuch places as were either even, or had but a very ſmall declivity. Afterwards comparing theſe compoſitions, with the work he had ſeen performed by the ſea, on her coaſts, and where ſhe could freely roll ſtones and flints, he knew that theſe beds of flints were ſituated preciſely in theſe grounds, whoſe diſpoſition did not naturally differ from thoſe in which the ſea daily forms ſimilar collections At laſt examining exactly the compoſition of theſe flint-beds, he found that it included abſolutely the ſame ſubſtances which the ſea brought to the ſhore; and that nothing might be wanting to a compleat proof, that the one came from the other, he found various ſhells and fiſh-bones in the collection of ſubſtances which formed theſe flint-beds. He even found that the ſand by which the whole maſs was united, was of the ſame nature and quality with that of the adjacent ſea; ſo that it was not poſſible to doubt but this kind of petrifaction was a preceding effect of the actual work of the ſame ſea upon its ſhores.

He was alſo confirmed in the ſame ſentiment, by a bed of hard ſand and ſmooth ſtone which was not very thick, and with which theſe beds of flint are generally covered. He knew that this ſuperior bed was the laſt work of the ſea, beating on theſe collections, and only conveying ſand mixed with ſhells to them. Theſe collections being in a ſtate

of perfect reſt by the retreat of the water, had at laſt contracted that extreme hardneſs, and adheſion, which they had not, when agitated by the billows: My grandfather found this kind of petrifaction in places very far from the ſea, and even on the tops of very high hills, which was a certain demonſtration that the ſea had reached thither, and that after having long remained there, and laboured for the collection of theſe ſubſtances, her waters had ſubſided all the height of theſe mountains, to their preſent ſurface.

FLINT-BEDS are very frequent about the city of *Marſeilles*. A bed of this kind, five or ſix foot thick, covers the whole plain of St. *Michael*, and over it is another bed of ſmooth ſtone, very thin, and formed by the ſand which the ſea had left in that plain. The new walls of *Marſeilles* are built of this flint, in which I have often obſerved pieces of earth incruſtated. We alſo find veins of it in almoſt all the roads which lead to the pleaſant farms which adorn its ſtony ſoil. Thus nature ſeems to have taken pleaſure, to place in the middle of that city, which owes its riches and reputation to the ſea, this ſenſible and infallible proof, that the rock on which it is built, was formed in the ſea.

THESE beds of concreted ſtone, lodged between two beds of ſmooth ſtone, have not been formed by flints and ſtones which the torrents of the neighbouring mountains may have brought thither, becauſe the little hill on which *Marſeilles* ſtands, is on all ſides ſeparated from theſe torrents by vallies. The ſea alone, which ſtill reaches to that mount, whoſe ſummit was diſpoſed to receive them, has raiſed them by its billows on the north-weſt, on a ground ſomewhat lower. The ſea alone could bring them thither, as you will eaſily judge on

obſervation, by conſidering the places, if you do not remember them ſufficiently to comprehend what I now have the honour of telling you. One of the arches of the aqueducts which conveys water to *Marſeilles*, is built on a ſimilar bed of flint oppoſite to *Aix-gate*. On the ſide of St. *Victor*, there are ſome of thoſe beds very remarkable, by the pains which have been taken to make ſtreets in that ſtony ground. Torrents and rivers may indeed form ſimilar collections, and ſuch are formed on the declivities of mountains, and at their feet by the ſtones and flints which tumble from their ſummits. But theſe collections have no conſiſtence, becauſe the earth by which they are joined, is not petrified like the ſand which is ſalted by the ſea.—If there is ſand mixed with the collections, formed by currents and rivers which may compoſe a hard concretion, yet it is certain that neither fiſh bones, nor any ſea-ſhells are found in them.

A ſecond kind of concretion in the ſurface of the mountains, or which, at leaſt, is neither conſiderably deep nor extenſive, attracted the attention of my grandfather, becauſe it is frequent. It is a collection of pieces of ſtone or marble, large in ſome quarries, ſmall in others, generally of uniform colours and qualities, though ſome of them are of a different kind. Theſe pieces are united by a mortar, ſometimes white, ſometimes gray, ſometimes brown, ſometimes black, yellow, rediſh, or of a different hue mixed of all theſe colours. This mortar is as hard and ſolid as the ſtones which it unites; and in this aſſemblage, we rarely find petrified wood, incruſtated ſtones and flints, which are generally found in flint-beds.—Theſe quarries were generally placed at the foot of ſome mountain, but were not arranged in beds like the others. On the contrary, their ſubſtance

was perfectly equal, and without any difference or diviſion. In meditating on this particularly, my grandfather judged by the poſition of theſe quarries, that they might be the ſame work at which, according to his obſervations, the ſea daily laboured, at the foot of ſteep mountains, whoſe wrecks falling into her, along with what the rains carry off, and what chance brings, are received into her bottom, buried at firſt in the mud, and afterwards covered by other ſubſtances which time throws upon them.

In order to know whether theſe quarries really owed their origin to this labour, my grandfather compared the ſtones of their compoſition, with theſe of the ſuperior places, and the cement which united them, with the mud of the adjacent ſeas. With reſpect to the ſtones, he found they were really of the ſame colour with theſe of the mountains raiſed above theſe quarries: But he obſerved this difference between them, that ſuch as were included in theſe compoſitions had a finer grain, and were more weighty than thoſe contained in the ſuperior places. As for the mud, he obſerved, that it was alſo of the ſame quality with that of the bottom of the adjacent ſea, but of a different colour.

These differences perplexed him at firſt, but it was not long before he knew the reaſon of them. He wiſely judged that the great hardneſs of the pieces of ſtone included in theſe concretions, could only be owing to the long continuance of theſe ſtones detached from the ſuperior quarries in the ſea, in a weighty mud in which they were buried. He did not doubt but the change of the colour of the mud proceeded from the hue which the riſing

grounds carried to the ſea by the rains, had communicated to it. In a word, when the earth of the places ſuperior to theſe quarries was white, brown or blackiſh, the mud which ſeemed to unite theſe ſtones retained perfectly the ſame colour; and it was red, yellow or greeniſh, when the more elevated earths were of theſe colours. For this reaſon the marble of *Saraveſſa* is ſo beautiful, becauſe, on the adjacent mountains there is an earth of ſo lively a red, that the canals through which the rain-waters flow from theſe mountains to the ſea, ſeem to be tinged with blood. This is eaſily obſervable by thoſe who paſs in boats from *Geneva* to *Portovenere*; nor is it to be doubted, but in the places where the rain-waters diſcharge themſelves into the ſea, there are quarries of marble preparing for our poſterity, like that of *Saraveſſa*, or at leaſt of a quality approaching to it. The marble of *Sicily* variegated with a beautiful yellow, which makes it ſo much eſteemed, has the ſame origin. This may be proved by the earth of the ſame colour and beauty ſtill found on the mountains ſuperior to the quarry of that marble. This, in a word, is the reaſon of all the other colours with which the quarries of this kind are variegated in all the different countries of the world.

It is however to be obſerved, that the colour of the mud which ſerves to form theſe quarries, is often more beautiful and lively than that of the ſuperior earths. The reaſon of this is evident; theſe earths having at firſt been pure, as all virgin earths are, and being ſo at the time of the compoſition of theſe quarries, to the mud of which they have ſerved to give a tincture, they have been afterwards altered, either by the mixture of the things they nouriſhed in their boſom, and which have been there petrified and confounded, or by extraneous

earths which the winds have conveyed thither.—However, they always retain marks enough of their firſt ſtate, to convince us, that they have formerly ſerved to tinge the cements of the quarries which are formed below them.

The reaſon why theſe quarries include neither petrified woods nor baked earths, was alſo obvious to my grandfather; for being formed under the water of the ſea, of ſubſtances which have been thrown into it, there cannot be wood found in them, which rarely goes to the bottom; neither can baked earths be found in them, except on very extraordinary occaſions: The broken pieces of bricks and tiles, which are the wrecks of our houſes, are not conveyed into the ſea from the tops of ſteep mountains, at the feet of which theſe quarries are formed, ſince very little is built on their ſummits, but on places of a gentle declivity. Neither do we diſcover in theſe quarries, at leaſt, not commonly, ſtones and flints made round, becauſe ſtones do not become round in the ſea, till they have been long rubbed againſt each other upon a ſhallow bottom, either of ſtone or firm ſand. The ſea, as I have already obſerved, cannot perform this work in deep water, nor convey flints to the tops of ſteep mountains, which break the force of her billows and currents, and force her to return upon herſelf. Beſides, in theſe places, the bottom conſiſting generally only of mud, every thing weighty or bulky is ſtopt at a diſtance by the ſoftneſs of the ſlime.—In a word, my father comprehended that theſe mountains could not be compoſed of beds, ſuch as are found in the mountains lodged in a free and open ſea, ſince the former are only the wrecks of theſe latter mountains, which falling at their feet are received into a mud proper to reunite them, and form them into a ſolid, whole, or maſs. The

ſmall extent of theſe quarries, and their oblong form, always terminating in a point, were ſtill, to my grandfather, evident demonſtrations of their origin.

He alſo obſerved, that the quarries of this kind, when placed at the feet of mountains of a ſubſtance which was ſoft and eaſily broken by the impreſſions of the air, ſuch as the quarries of black, gray, or agate-coloured marble, were compoſed of very ſmall pieces; whereas, when they were ſituated at the foot of mountains, compoſed of hard ſtones that are with difficulty mouldered, ſuch as all the mountains made of mud or fine ſand, the pieces which compoſed theſe inferior quarries, were of a much larger bulk. In order to convince himſelf that the one came from the other, he obſerved, that the higher and ſteeper the ſuperior mountains were, the more conſiderable were the quarries formed at their feet, which could only proceed from the greater quantity of their wrecks, which had had leiſure to fall, and be accumulated in a long ſpace of time neceſſary to exhauſt a deep ſea. In a word, to omit nothing proper to inſtruct him in the origin of theſe concretions, and to eſtabliſh their truth, he pounded the ſtones of them, in the compoſition of which he found, as in the flint-beds, though leſs frequently, the bones of ſea-fiſh, and ſhells. After this he thought he had no reaſon to doubt, but that theſe ſmall quarries were the work of the waters of the ſea, as well as the flint-beds. From this he concluded, that the ſea had beat a long time on the parts where the quarries were ſituated, ſince it had been able to form ſimilar collections, and conſequently had been diminiſhed by all the elevation obſerved from its ſurface to theſe quarries. The mountains in our neighbourhood are intermixed with pertifications

of this kind, all of marble. There are alſo a great many of them in *Europe*, both of marble and ſtone. There are petrifications of this kind in ſome places in *Provence*, and even theſe conſiderably high, ſince they are found in the neighbourhood of St. *Baume*. There are alſo others in *France*. There are many of them in *Spain*, eſpecially in the *Perinean* mountains; in *Flanders*; in *Lorrain*; in the ſtates of *Geneva*; in *Switzerland*; and in *Sicily*.—There are ſome of them very beautiful in *Aſia*, but always at the foot of mountains, and of the ſame colour with their ſubſtance. When this kind of petrification is marble, it is very agreeable to the eye, by the variety obſervable in it on account of the cement tinged in a hundred different manners, and ſerved to unite the pieces of which it is compoſed. This marble is the matter of a great many pillars, with which churches are adorned, eſpecially in *Italy*. Tables are alſo made of it, and decorations for chimnies in houſes and palaces.

Two other kinds of petrifications near the ſurface of the mountains, and which may be reduced to one, ſince they are of the ſame kind, were alſo the objects of my grandfather's reflections; I mean the rock-ſtone and the pumice, which hardly differ in the poſition of their ſmall quarries, and but very little in the ſubſtances of which they are compoſed. The pumice is only leſs ſolid than the rock-ſtone; it is alſo more porous, and leſs equal in its compoſition.

In order to know the reaſon of this difference, it is to be obſerved, that the bottom of the ſea furniſhes a great deal more impurities in ſome places than in others. It is fuller of theſe impurities on the coaſt, where rivers and torrents diſcharge themſelves, than at a greater diſtance from the

ſhore. In a word, there are much fewer impurities in bottoms which are ſand or mud, than on the ſhores, which are often embarraſſed with rocks, where theſe impurities are collected, and to which they adhere. Thus, when in a tempeſt the billows of the ſea have torn from theſe rocks and ſhallow places, the viſcoſities, moſs, ſnails, ſhells, and a thouſand other impurities, which are proper to them, as may be diſtinguiſhed by the eye, in bottoms of this kind, they are carried to the ſhore with the ſand and ſmall flints—There, with the cement of the froth and the ſalt of the water, the ſea fixes all theſe ſubſtances to the ſurfaces of the ſhores, which ſhe ſtill waſhes with the extremity of her waves, and makes of the whole a compoſition as unequal in hardneſs, as the natures of the ſubſtances employed in its formation are different. The holes contained in this pumice are the cavities formed by a little moſs, the viſcoſity of ſnails, or other bulky ſubſtances, without a due conſiſtence, which have entered the original compoſition. Theſe ſubſtances have been conſumed by time, which reduced them to a little duſt or earth, which is to be found in theſe cavities. On the contrary, when the ſea by its billows throws on ſhore more equal ſubſtances, and fewer viſcoſities and moſſes, ſhe compoſes a leſs rough, and a better formed ſtone, which is called rock-ſtone. The mouldering of certain mountains, alſo, contributes to the compoſition of this ſtone, becauſe the ſand and ſmall gravel which are detached from them, and which are carried to the ſea by a gentle declivity, are re-united by the waves at the foot of theſe mountains, with the other ſubſtances which they convey thither.

My grandfather, who had ſtudied the various works performed in the bottom of the ſea, eſpecial-

ly on the coaſts, eaſily diſcovered this truth: He found in theſe two kinds of ſtone, the ſame compoſition which the ſea daily produces, almoſt every moment, in fixing to ſtony bottoms or ſmall rocks, which it ſtill waſhes with the extremity of its waves, the ſubſtances which its waters contained, or which were carried to them from the adjacent mountains. The poſition of theſe quarries of pumice and rock-ſtone, had the ſame aſpect as thoſe places where the ſea had formed ſimilar ones upon the coaſts.— Thus the ſuperficial quarries in the large mountains, which he had found very near their higheſt ſummits, were to him new proofs, both of the long continuance of the ſea in ſuch elevated places, and of the prodigious diminution of her water if we form an eſtimate of this affair from her preſent boundaries, and the elevation of theſe places.

These two kinds of quarries are however much leſs frequent, and thick near the tops of high mountains, than about the middle; and ſtill leſs ſo about their middle, than at their feet, and in places at preſent near the ſea. The reaſon of this is obvious; the rock and pumice ſtones are compoſed of the wrecks of certain mountains, of ſhells and impurities which ſhe brings along with her. Now nothing of all this exiſted at the time of the diſcovery of the firſt ſoils. The ſea could not break them, nor convey their wrecks to their feet, till after they had appeared: Its waters at firſt contained but very few ſhells, ſince they are only found near the ſhores, which were but of a ſmall extent at firſt.— The ſea-water was not then full of all the impurities which the rain-water, and a certain ſlime it brings along with it, produce and nouriſh in the boſom of the ſea; ſince the firſt grounds were of a ſmall extent, had not as yet been mouldered by the injuries of the air, and only furniſhed the ſea

with ſome veins of water, or at leaſt with ſmall rivulets. As yet their waters muſt have been very pure, ſince they only waſhed rocks without earth, without herbs, and without ſhrubs. All theſe circumſtances are changed by the longer duration of grounds, by the loſs which the rocks have ſuſtained of a part of their ſubſtance, by the multiplication of herbs and leaves, by the abundance of turbid waters which the ſea has ſince received, and by the adherence of ſhells, and all the impurities which ſhe has contracted.———Theſe works were alſo augmented in proportion as our grounds were uncovered, the ſubſtances which the ſea employs in her labours being increaſed according to the dimunition of her waters. Hence it happens, that all kinds of ſtone or marble in the ſurfaces of mountains, of the wrecks of which they have been formed, are much leſs frequent and deep in high, than in low-lying places, becauſe in their laſt, the ſea has found more materials to work upon.

In general, my grandfather, in this petrification in the ſurface of our ſoils, found numberleſs ſhells, ſome known, others abſolutely unknown, or ſuch as are very rare on the adjacent coaſts.—He found in particular a great many corneamons, which are very frequent in the ſtones of *France*, though none of them are found on the coaſts of *France*. He alſo obſerved that the unknown ſhells were more deeply ſunk in theſe compoſitions, whereas, thoſe which are frequent on our coaſts were ſituated nearer their ſurfaces. In ſearching for the reaſon of this difference, he judged that it proceeded from this, that the ſhells unknown on our ſhores, which he had found in certain bottoms, had been petrified in the bottoms, with the mud, before it could be uncovered by the water; that

afterwards this petrification approaching to the ſurface of the ſea, or being already at it, another kind of ſhells, ſuch as we ſee on our coaſts, and ſuch as love the air more than the former, had compoſed a cruſt on this firſt ſtone, as it was common for the ſea to clothe the rocks it ſtill waſhed, with them, before it left theſe rocks; and that conſequently theſe laſt ſhells muſt be found in the external parts of the maſs, before we arrive at the internal parts, where the firſt mentioned ſhells are included.

My grandfather afterwards diſcovered other petrifications deeper and larger than the former, but which were not of a very great extent. Theſe were certain ſmall mountains ſeparated from the large ones, and generally placed at their foot, or at a ſmall diſtance, moſt frequently at the entry of large vallies, or in places not far from them.—— Theſe ſmall mountains, I call them ſo in compariſon of height and extent of the other mountains, are the ſame, and in the ſame poſition with the quarries of ſlate, or of certain tender marbles, ſuch as the black, the agate-coloured, thoſe mixed of red and green, and of yellow and white, and ſome other ſpecies. In examining the variegation of theſe marbles, my grandfather diſcovered that there were two kinds of them; the firſt is the effect of certain waves which are principally found in the agate-coloured, the rediſh, the green, and ſuch as approach to theſe colours. A great deal of this kind is employed in the houſes of *Paris*. The accidental variegation conſiſts in certain ſtreaks, generally white or yellow, which are found in theſe marbles, and in ſeveral quarries of ſtone

He judged that theſe waves obſervable in certain marbles, proceeded from certain ſtrong impulſes,

which their ſubſtance, as yet almoſt liquid and without conſiſtence, could not reſiſt; that the greeniſh colour with which ſome of theſe ſtones are tinged, could proceed from nothing elſe but herbs inſerted in their compoſition, into which they could not enter, except when the matter was ſoft; and that the waves obſervable in their ſubſtance was an undoubted proof of this truth: Theſe waves, in a word, ſuppoſed the ſame ſtate of theſe ſubſtances, without which the mixtures of the different ſlimes of which theſe marbles were compoſed, could not have been made. The eaſineſs with which theſe marbles were reduced to ſcales or flakes, convinced him that they were only compoſed of mud and ſlime indurated. In a word, conſidering their poſition, he concluded that ſuch collections were natural in theſe places, and muſt have been formed there by the ſlime of the rivers and torrents, which flowed from the vallies into the ſea, at the time when ſhe was ſuperior to theſe quarries. Thus, in his obſervations on the daily labour of the ſea, he knew, that ſimilar collections were at preſent made in her, near the diſemboguements of rivers or torrents which fall into her. This appeared ſufficiently evident to him from the various bones of ſea and river fiſh which he found in ſeveral of theſe quarries, ſince with their waters and their ſlime, theſe rivers muſt have carried to the ſea ſome of the fiſh they contained, either dead or alive.

As for the ſtreaks with which almoſt all theſe marbles are variegated, at leaſt on their ſurfaces, he knew that they were an effect poſterior to the appearance of theſe ſmall hills above the waters of the ſea, that being formed of a muddy matter which is eaſily warped, and that being acted upon by the air, the ſun and froſt, they had been divided into clefts, into which receiving the rain and ſea-

waters which ſometimes covered them, they had contracted theſe variegations, according to the earths and ſlimes contained in theſe waters, this matter, which may be looked upon as a kind of glew or cement, having ſerved to reunite the different pieces or flakes into which their ſurfaces were already divided.

In order to ſupport this ſentiment he obſerved, that theſe ſtreaks were of the ſame colour with the various ſlimes of the ſea, by which the quarries were waſhed, or with the earth on their ſummits; and that where the earth was whitiſh, the ſtreaks of the marble were equally ſo. Such is the variegation of ſeveral quarries of black marble, found in *Switzerland* and ſome other parts. Such alſo is the variegation of ſeveral ſtones dug up in *Tuſcany*, with which the ſtreets of *Leghorn* are paved; and of a hundred others kind of ſtones, whoſe ſubſtances, though ſolid, is yet eaſily warped and fiſſured. He found on the contrary, that in the places where the earth on the ſummit of theſe quarries was yellowiſh, as in the iſle before *Portovenere*, whence black marble, marked with yellow ſtreaks approaching to a gold colour, is dug, the ſtones were variegated with the ſame colour. This was a new proof that the variety of ſtreaks common to ſo many marbles, has no other origin than that now mentioned. We alſo ſometimes ſee in the ſame piece of marble, ſtreaks of a white, and others of a yellow colour. Whence proceeds this difference? if not from this, that ſome of them are the work of a vein of water, tinged yellow with an earth of that colour which it imbibed; and others, that of a water which had run through a white earth.

That theſe ſtreaks really proceed from the warping and fiſſures of theſe ſtones and marbles af-

ter the ſea has left them, my grandfather found another ſenſible proof, which is, that if the foot of theſe quarries is ſtill waſhed by the waves, we do not at their bottom find the variegations to be obſerved at their ſummits; that they are of an equal colour, or at leaſt waved and varied without any mixture of theſe ſtreaks; and even in the places where theſe quarries are far from the ſea, their internal part which is ſheltered from the wind, the cold and the ſun preſents none of theſe variegations. This I myſelf have obſerved in ſeveral quarries of *Europe*, eſpecially that ſituated before *Portovenere*, whoſe variegations are diminiſhed in proportion as we go farther from the ſurface, and at laſt totally diſappear. In a word, he found in the matter of theſe ſtreaks, flies and various other land inſects, which could not enter into it, if theſe ſtreaks had not been poſterior to the fabrication of the ſubſtance of theſe ſtones, and to their appearing above the waters of the ſea. Frequently alſo, ſeveral of theſe ſtreaks were marked with green, which proceeded from the leaves or herbs, which being conveyed into theſe clefts or fiſſures by the rain-water, had tinged the mud which they touched.

The nature of theſe quarries, and their poſition, were, to my grandfather, prepared by the obſervations he had made on the works of the ſea, near the diſembogumcnts of rivers and torrents, new proofs of the diminution of her waters. At the foot of theſe quarries, whoſe ſurface is eaſily warped and reduced to flakes, there are generally others, eſpecially on the ſteepeſt coaſts. Theſe have been formed of the wrecks of the ſubſtance of the others, reunited by the ſand or mud of the ſea into which they had fallen when it was ſtill at the foot of them; and this aſſemblage alſo ſubject

to wrap, and by that means ſuſceptible of variegations, compoſes a kind of ſpeckled or *moſaick* work, very agreeable to the eye, and of which we find ſome ornaments in the houſes of *Paris*.— The pieces of which theſe quarries are formed, are generally very ſmall. In this they differ from thoſe I have mentioned, the ſubſtance of which is not ſo eaſily broken; but the quality of the marble, ſand and mud, which compoſe theſe ſmall quarries, the ſea-ſhells inſerted in them, and their poſition, are, as well as in the others, certain proofs of the ſtate of the water of the ſea, at the time of their formation, and conſequently of the diminution which has ſince happened to that water.

After the examination of theſe various petrifications on the ſurface of the large mountains, of which we might ſay the former are the daughters, my grandfather reſolved to uſe all his application in examining the compoſition and origin of theſe alſo. With this view he ordered deep pits to be dug in ſeveral parts, even in the moſt lofty ſummits of theſe mountains, as far as their loweſt entrails.— He viſited the quarries whence ſtones were dug in the places where the mountains were higheſt, or he went to theſe places where the mountains were either ſplit, undermined by time, cut, penetrated, or razed to a level, in order to make roads, raiſe fortifications, or afford paſſages for rivers. He carefully interrogated thoſe who had the charge of theſe works, the diggers of the ſtones, thoſe who cut them, and thoſe employed in digging the pits. He with no leſs attention examined the mountains or little hills of hard ſand, which are never ſo high as mountains of ſtone, neither have they been formed till long after them out of their wrecks, beſides they are in ſuch a ſituation, that the agitation of

the waves which waſhed the parts where they are, the quality of the ſands which compoſed them, and the mixture of the freſh water, have not permitted them to be petrified. My grandfather ſpent ſeveral years in this occupation, and after long meditations on the internal and external parts of all mountains, he, with my deceaſed father, who imitated him in this ſtudy, and whom he conducted every where with him, made a collection of obſervations, the ſubſtance of which is as follows:

That all mountains or ſoils are originally but ſand or ſtone; that ſtone is compoſed of indurated ſand or mud, or of a mixture of both, or formed of clay and theſe other depoſitions of the water of the ſea, which are found in its bottom by means of the plummer, or by diving.

That the diverſity of colour in ſtones proceeds from the diverſity of the grain, and of the ſubſtances which have entered into their reſpective petrifications.

That all primitive mountains of ſtone, and even of hard ſand not petrified, are compoſed of beds arranged over each other, almoſt always horizontally, thicker or thinner, and often of an unequal colour and hardneſs, which can only proceed from the ſucceſſive arrangement of the different matters of which theſe collections are formed.

That theſe arrangements are found from the tops of the higheſt mountains, to their profoundeſt abyſſes, and even till we arrive at water. That when we go beyond the water, we only ſearch with little certainty, and can diſtinguiſh nothing

with reſpect to the arrangement of the ſubſtances found there.

That it is not poſſible to imagine, that the arrangement of theſe matters different in quality, ſubſtance, colour, and hardneſs, which we find in the beds of all large mountains, could be produced otherwiſe than in the ſea, and by the different matters which its waters contain during the time neceſſary to the fabrication of theſe prodigious collections; nor that the other petrifications adhering to them, and formed of their wrecks, were formed by another cauſe, than the aſſiſtance of the ſea, acting ſucceſſively upon them.

That for a proof in this truth, the ſea on her bottom ſtill continues the ſame labour, as may be proved by diving into her; that along her ſhores, we find the ſame arrangement of beds of different matters, as yet not indurated, at leaſt in ſeveral places; and that we alſo find upon the coaſts, collections of the ſame matters which are employed in the petrifications, adhering to the ſurface of all large mountains.

That beſides theſe obvious proofs that all large mountains have been formed in this matter, they alſo contain a great many others which admit of no reply. In a word, that even in places moſt diſtant from the ſea, they are to this day covered in a thouſand parts of their ſurfaces, with a prodigious number of ſhells; and that on the ſummits of the higheſt mountains, we find ſeveral rocks entirely compoſed of ſhells; that the internal parts of mountains alſo include an infinite number of the ſame ſhells, and of all kinds of ſea fiſh, the largeſt not excepted; that whole banks of oyſters are found inſerted in their boſoms, and a ſurpriſing

quantity of extraneous bodies all arranged in the ſame manner; that from this we ought to conclude, that theſe bodies could only enter into theſe enormous maſſes and be included in them, becauſe at the time of the fabrication of theſe mountains, they have been thrown to theſe parts, and buried at the height where we find them, as are the materials of a wall which we ſee built.

That the difference of quality and colour, of one bed of the ſame ſtone, from another, proceeds from this, that the currents proper to the waters of the ſea, as the winds are to the air which we breathe, after having paſſed through certain places with rapidity, and carried off the matter with which they are impregnated, find matter of another kind which they alſo convey ſucceſſively to the places where they terminate; that they there form, by the depoſition of all theſe matters, beds as different in ſubſtance, as the ſlimes are which they contain.

That there are ſea-ſhells, and a much larger quantity of other extraneous matter in the ſubſtance of certain quarries, and that in conſidering the diſpoſition of the places where they are ſituated, it is evident that we ought not to ſeek for any other reaſon for theſe facts, than that theſe quarries have been formed in the bottom of a gulph, or in parts where currents muſt naturally convey ſuch things, rather than to other places.

That theſe extraneous bodies, eſpecially ſhells, and the bones of ſea-fiſh, are very rare at the bottom of quarries, leſs rare at their middle, and more frequent towards their ſurface, which proceeds from this, that the waters of the ſea muſt naturally contain few fiſh, and almoſt no ſhells, when they covered the tops of our mountains;

that in a word, there was nothing in the bottom of the ſea proper for the nouriſhment of either, ſo that they have not been multiplied nor perhaps formed, except when the firſt ſummits of our mountains were ready to appear, becauſe in order to be brought to life, they required the aſſiſtance of the adjacent air.

In order, Sir, continued our philoſopher, to give you a general idea of the primitive ſtate of our globe, and to conduct you inſenſibly to a knowledge of the compoſition of our ſoils, imagine to yourſelf, as I have begun to prove to you, that the ſea has been a great many cubits higher than the higheſt of all our mountains.* The preciſe elevation of its waters above their ſummits, is unknown to us, and the meaſure of it cannot be aſcertained. But we cannot doubt, after the proofs I am to advance, but there has been a time when the waters covered theſe mountains, and that they did not begin to be diminiſhed till after they had formed the laſt beds of them.

Whatever might have been the elevation of the waters above our mountains, they did not then contain ſhells and fiſh. It is at leaſt certain, that they contained very few of theſe, becauſe there were then no grounds near the ſurface of the water, which alone are able to ſupply them with proper nouriſhment; and that long after the firſt diminution of the waters, the fiſh and ſhells were very few. A proof of what I advance, is, that at preſent there are very few fiſh in ſuch ſeas as are either far from the ſhore, or very deep. For this

* It is under this image that *Ovid* repreſents the earth in the chaos, that is, before the ground began to appear.—This is alſo the idea *Moſes* gives of it in *Gen. i. 2. And darkneſs was upon the face of the deep.*

reaſon, inſtead of finding indifferently, in all the quarries of our globe, fiſh-bones, ſhells, or other extraneous bodies, we find in ſome nothing but a ſimple and uniform ſubſtance; ſuch is that obſervable in primitive mountains—I mean theſe high and large mountains which ſurpaſs all thoſe around them, and which we muſt carefully diſtinguiſh from theſe laſt which were formed poſterior to them, and of their wrecks. Now it is principally in theſe laſt, that we find extraneous bodies, bones of fiſh and ſhells, which are very rare in the others, or which are only diſcovered on their ſurfaces.

By what I have ſaid, Sir, you may eaſily comprehend the reaſon of this difference. In a word, while the waters of the ſea covered the ſummits of the higheſt mountains; that is, while they were employed in forming them, there could nothing but ſand or mud enter their compoſition, ſince the ſea contained nothing elſe which ſhe could uſe for that purpoſe; as ſhe then nouriſhed but very few ſhell-fiſh, we muſt but rarely meet with ſhells in theſe firſt collections. The currents employed in this work, containing only ſand or ſlime, which they detached from certain bottoms, or which they had contracted in the manner I ſhall afterwards mention; had as yet no other materials to work upon. But when the ſummits of theſe primitive mountains where ready to appear above the waters, the herbs began to grow upon the eminences next to the air. At the ſame time the fiſh and the ſhells were multiplied, and began to enter into the new compoſitions, which the ſea continued to form at the ſides of the great mountains, on their declivities, or at the intervals which her currents had made between them.

It was in theſe mountains poſterior to the others, that plants, leaves of trees, fiſh-bones, and ſea-

ſhells, began to be found. If in theſe laſt, we alſo find ſome other extraneous bodies, ſuch as flints and others different from their own ſubſtance, the reaſon for this is very natural: The ſummits of the firſt mountains having appeared, were attacked by the impetuoſity of the winds and of the waves natural to the ſurface of the ſea. Their ſubſtance being as yet tender, was by them broken and moulded in ſeveral parts. Heat and cold aided the billows, which were alſo aſſiſted by the rivers and torrents which the rains formed. Every thing which was by this means detached from the ſubſtance of the firſt grounds, began to enter into the new labours of the ſea: Of theſe new collections, the next to the ſummits of the firſt mountains were attacked and broken in their turn, in proportion as they appeared above the ſurface of the waves; and their wrecks were in the ſame manner employed in the compoſition of ſimilar works, which the ſea formed below them.

The ruins of theſe three, afterwards ſerved the ſame end, and lower mountains were formed of them; theſe generated others, and theſe works will continue as long as there are ſeas, and the ſuperior mountains ſhall, with their wrecks, ſupply materials to the waves and currents, to compoſe new collections at their feet, as long as the rains, the rivers, and the torrents ſhall convey ſubſtances thither, and as long as the impetuoſity of the winds ſhall carry thither the ſand and duſt, which it has blown from the land. This is the reaſon, why in the ſubſtance of ſeveral marbles, we find ſo many ſtones and flints of a nature abſolutely different. In a word, an infinite number of theſe heterogeneous bodies has perhaps already ſerved to the fabrication of five or ſix other different quarries, from which they have been ſucceſſively de-

rached. It is alſo for this reaſon, that ſome of theſe pieces are ſtreaked with white and yellow, though theſe ſtreaks are not common to other contiguous pieces, which certainly proceeds from this, that before entering into theſe laſt compoſitions, theſe pieces making a part of the ſurface of a mountain anterior to this, had there been cloven and re-united in the manner above explained.—Herbs, the leaves of trees, fruits, inſects, animals, and ſeveral other things which the earth produces, and which are inſerted in the white or yellow of theſe ſtreaks, are evident proofs of their origin.

It is then principally ſince the uncovering of the tops of the higheſt mountains, and in the manner I have explained to you, that extraneous bodies, fiſh-bones, and ſhells, have entered into the works of the ſea; and then the wrecks of theſe mountains multiplying, contributed to the multiplication of new works, which lengthened the riſing grounds. By the extent of her ſhores, the ſea nouriſhes in her waters a greater number of fiſh and ſhell-fiſh; and theſe are more and more multiplied in her, in proportion as her diminution becomes more conſiderable. We have not only found in the ſubſtance of theſe works, poſterior to the primitive mountains, ſhells, and fiſh-bones; but alſo, whole fiſh of all kinds in their deepeſt entrails. Theſe are to be found in quarries of marble, ſlate, and ſtone, though more frequently in ſome than in others.—There are no kinds of animals either on the earth, or in the ſea, which are not found in them. As for ſea-ſhells, there are in theſe quarries a vaſt number of them, the ſpecies of which are entirely unknown to us.

At this part of our converſation, I began to reliſh the obſervations of our philoſopher; but

we were interrupted by the coming of an *Indian* chriſtian; he came to beg me to go immediately, and be a witneſs to the death of another *Indian* who was a chriſtian as well as himſelf.

THOUGH I had no connection with theſe *Indians*, yet my religion did not permit me to neglect ſo favourable an opportunity of doing good. I begged TELLIAMED to defer the reſt of his converſation till next day, and ran to the merchant whom I found at the point of death. I ſhall not give you an account of every thing I ſaw in that place.—What ſurpriſed me moſt, was a baſon near the dying perſon, full of a thick and greeniſh liquor, with which they ſprinkled him now and then: I at firſt took it for ſome compoſition proper to ſtrengthen and comfort him, but having aſked what it was, I was to my great ſurpriſe, told that it was holy-water, in which cow's dung had been ſteeped. You know, Sir, the ſtupid reſpect which the idolatrous *Indians* retain for that animal,† but I could not have thought to find ſo groſs and ridiculous a piece of ſuperſtition among chriſtians; I diſcovered my diſlike of it to two or three friends of the merchant, who had attended him during his illneſs; but they ſtopt my mouth by telling me, that the miſſionaries had never found fault with it; that they uſed no other holy water in their churches;

† One of the greateſt marks of this ſuperſtitious reſpect, is, that the *Indians* can think of no greater happineſs than that of holding a cow's tail in their hand, when they are dying. As theſe people believe the tranſmigration of ſouls, they imagine that by this means the ſoul will paſs directly into the body of that animal; and they think they cannot wiſh for a more agreeable abode. The uſe which they make of the excrements of this animal, in their ablutions and purifications, is ſufficiently known. Though they have committed the moſt atrocious crimes, they believe themſelves ſanctified as ſoon as they are rubbed with it from the head to the feet.

that ſince they had preſerved the *Lingan**, they ſaw no reaſon why they ſhould baniſh the uſe of cow's dung. This fact which may, perhaps, appear incredible to you, is confirmed by a *French* miſſionary, who having reſided ſeveral years in the *Indies*, was obliged to tolerate it on account of the complaiſance neceſſary to gain that people to chriſtianity: But I leave you to judge of what kind this pretended chriſtianity muſt be.

* The obſcene figure of an idol which theſe people adore, and which they hang about their necks.

END OF FIRST DISCOURSE.

TELLIAMED;

OR, THE

WORLD EXPLAIN'D.

Second Day.

THE TRUTH OF THE LAST DISCOURSE—AND ITS CONSEQUENCES PROVED BY FACTS.

TELLIAMED did not fail to keep his assignation the next day, and accosting me with an air of confidence; I know not, Sir, said he, what you think of our yesterday's conversation, or whether I have had the happiness to convince you of the truth concerning which I wanted to instruct you. The variety of different matters of which this globe is composed, the cement which unites them, their almost uniform arrangement of beds horizontally placed over each other; in a word, their position, aspect, and the surprizing conformity I have shown you in all this with the labour of the sea, in her bottom, or upon her shores; all these circumstances in conjunction, infallibly and sensibly prove the origin of our soils. But if you should still doubt of it, permit me by evident and well-attested

facts to confirm what I have ſaid, and by that means demonſtrate the truth of my ſyſtem.

An *Arabian* author whom you lent me, relates, that in digging a well behind the caſtle of *Cairo*, which in the *Arabian* language is called *Carafe*, after having pierced a rock more than two hundred feet deep, when the labourers came to the water they found a whole beam of timber: But as the teſtimony of an author of that nation may be ſuſpected by you; I ſhall give you another concerning a diſcovery of the ſame kind, which will not permit you to doubt of the former fact.

In the year 1714 of your Æra, the great duke of *Tuſcany* having employed men to dig a ditch from the old infirmary of *Leghorn*, to the new, called *St. James*, through a rock, which at the depth of twenty feet terminated on mud, in which was found a tree of ten or twelve feet in length, hollow within, and which I and others take to have been a pump to ſome ſhip; it was ſunk two or three feet deep in a clayey ſoil, in which were alſo various ſea-ſhells, of kinds unknown in the neighbouring ſea; ſome pine-apples entire, the horns, the bones, and the teeth of animals. I was at *Leghorn*, and preſent at the time this diſcovery was made, and with my own eyes ſaw two large baſkets filled with theſe ſubſtances, which with the beam of wood were preſented to the grand duke.

I have alſo ſeen in a ſteep rock of the *Apennine* mountains, which a torrent had undermined, the prow of a ſhip which ſtood out ſix cubits. It was petrified, and its hardneſs had reſiſted the force of the torrent, while the ſtone of a rock was undermined by it. This place is not far from *Mont-joue*. I wanted a long rope to deſcend from the ſummit of the mountain to the part where this ſhip ap-

peared, in order to examine it more accurately. It would be curious to draw the whole of it from the rock, in order to know the form of the ſhips uſed at the time when it was wrecked. Though it is very common to find the wrecks of ſhips in quarries, yet it is very difficult to know the form of them, becauſe, at preſent, making a part of the ſtone itſelf, they are broken by the workmen, before it can be known what the whole was, which theſe parts formed.

These facts will, no doubt, appear ſurpriſing, but they are confirmed by authors of veracity who do not invent prodigies. *Fulgoſe* an *Italian* author, relates that in 1460 there was found in the canton of *Berne*, in a place where miners were working, and a hundred fathoms deep, a whole ſhip, almoſt like thoſe uſed at preſent; and in this ſhip, in which the marks of the ſails, cordage and anchors were ſtill obſervable, were the bodies or bones of forty perſons. This ſhip which then made a great noiſe in *Switzerland*, and even in the whole chriſtian world, was ſeen by an incredible number of witneſſes, from many of whom the author aſſures us he had the account of it. *Bertazzolo* alſo relates, that in laying the foundation of the ſluice of *Governolo* in the territories of *Mantua*, he, in digging the earth found ſeveral pieces of ſhips, and a large quantity of ſea-ruſhes and herbs.

In *Dalmatia*, a few years ago, when the labourers were working on the fortifications of the caſtle above the citadel of *Caſtelnuovo* upon the gulph of *Cattaro*, ten feet under the foundation of the ancient walls they found an iron anchor ſo conſumed by time and ruſt, that it bended like lead. *Bernard*, the *French* engineer, who had the charge of theſe

fortifications, assured me, that he saw the anchor. Another was also found about twenty-five or thirty years before, in digging the foundation of a house in *Padua*.

It is very common for those who travel through the sandy deserts of *Lybia* and *Africa*, to find in digging wells, small pieces of petrified ships, which were no doubt wrecked when the sea covered these parts. They also find there a great many pieces of petrified wood, which are probably the wrecks of some other similar ships. About a day and a half, or at most two days journey to the westward of *Cairo*, there is in the middle of a desart of sand, a pretty long valley bounded and interspersed with rocks, and at present partly filled with sand. This place is by the *Arabs* called *Bahar-Balaama*, that is, without water, because the plain is dried up.—In it are found a great many barks and ships which had been formerly wrecked, and are now petrified: we there find masts and yards, many of which are entire. When this place was a bed for the sea, it was, no doubt, very dangerous for navigation, as the remains of these ships piled upon each other, sufficiently prove.

What is astonishing is, that in stones we find the bones of men and other animals. In the royal library of *Paris*, I have seen a bone taken from the skeleton of a man entirely petrified, and found in the plaister quarry of *Montmartre*. I was also assured in that capital, that some time before, there was another found in the quarries of *Arcueil*, and near it a sword much consumed by rust. Not long ago there was one dug up at *St. Angel*, near *Moret*, in *Gatenois*, from ground belonging to Mr. *Caumartin*: It was found in a mountain of marble, and was fourteen feet long, which proves that there

have been giants. About thirty years ago there was a fourth found at Cape *Coronne* near *Mortigues*, in the quarries of free-ſtone uſed for building the houſes of that town: This body, lying on its back, had its legs turned up, and was certainly one of theſe frequent victims which the gulph of *Lyons* received. A few years ago there was another found in a large piece of ſtone, employed in building a church in that city; and when I was there, they ſhewed me a piece of ſtone, in which was the thigh of a man petrified. What ſurprized me was, that in this thigh I found the bone and the fleſh equally petrified, which I had never ſeen before.—Some years ago, in a ſtone taken from the plaiſter quarry of *Piſſe-fontaine* near *Poiſſi*, there was found an egg as big as thoſe of an *Indian* turkey, full of a yellowiſh liquor; and hard by it, a large ſea-ſhell. *Philip* the fifth of *Spain* having ordered ſome embelliſhments to be made in the *Eſcurial*, the workmen in ſawing a ſtone found a ſerpent which had remained without alteration. They extracted it, and found the hole in the ſtone to be ſpiral, according to the poſition of its body. The whole court of *Spain* was witneſs to this prodigy.

All the ſtones in the world, except thoſe formed before the uncovering the ſummits of high mountains, are more or leſs filled with ſuch bodies.—Theſe bodies of a different nature, and often of a different colour from thoſe in which they are inſerted, are, as well as thoſe I ſhall afterwards mention, a certain and inconteſtable proof that they have entered into the compoſition of the ſtones, at the time when the fabrication of theſe quarries was only at the height at which ſuch bodies are found; that they were conſequently of a ſoft and almoſt liquid ſubſtance, whether the cement of them be ſand or mud; that this fabrication could not be

carried on without the assistance of the sea, and out of her bosom; and that to raise the mass of these mountains to their highest summits, and to rear these lofty edifices, it was necessary that the waves should cover them totally.

There are a great many small pieces of flint, or of large gravel in your free-stone of *Paris*, especially in parts where the quarries terminate in beds of sand, on which we see they have been formed of another more fine and proper for petrification. These stones are more beautiful or ugly to a certain thickness. Whence, Sir, does this proceed, if not from this, that when the ugly bed was formed, the flints or gravel have been carried to it by the waters of the sea; and that after some time, the gravel and flint failing, the water has brought a finer sand thither? It is thus, as I observed to you before, that nature operates in the formation of flint-beds*.

In a word, how without this could it happen, that in the white stone employed in building the cathedral of *Rouen*, and in a hundred other places of *Normandy*, we should find large pieces of black stone, and elsewhere pieces of white stone in black or large flints of a very different quality from the stones which include them, pieces of marble inclosed in common stone, and common stone inclosed in marble, marle, and a hundred other extraneous bodies, even in the hardest flints? How can we account for this prodigy, if we do not admit,

* In the quarries of free-stone near *St. Leu Taverni*, I have seen stones split, in which were shells and small sea flints, of which the sea is generally full, and I have observed, that the surface of these beds of free-stone is covered with sand entirely, like that on the sea-shore. *Jessieu* Dissert. on herbs, sea-shells, and other bodies found in certain stones in St. *Chaumont* in *Lyons*.

that while the ſea was employed, for example, in forming this white ſtone, the currents or a tempeſt, have carried into the mud or ſand of that colour, which was then collecting into a heap, ſome pieces detached from a black rock, and inſerted them in that ſand or mud, in the middle of which we now find theſe variegations?

I have been aſſured, when at *Paris*, that in ſawing that large piece of ſtone whoſe equal parts form the top of the frontiſpiece of the great entry of the *Louvre* on the ſide of St. *Germain*, the workmen about the middle of it found a bar of iron like the barrel of a gun, which the ſaw could not cut on either ſide; ſo that they were obliged to uſe wedges in order to ſeparate the two pieces of ſtone. This fact is ſo much the more ſingular as it is notorious, and proves that there is a kind of iron which ruſt does not conſume.

Are not ſuch things daily found preparing in the ſame manner on the ſea-ſhore, for the uſe of future ages? When the ſea in her reflux leaves plains of ſand or mud, do we not find pieces of ſtone or flint, of a different colour from this ſand or mud, already half immerſed in them? and do we not a few days after, find them totally covered by new ſand or mud? We find the ſame kind of work in ſearching the neighbouring mountains. This is particularly obſervable in the mountains which run along the coaſt of the river *Seine*, from *Havre de Grace* to *Paris*. This is diſcoverable in the ſtone with which the fortifications of the *Havre*, and the moles of that port are built. In the iſle of *Scio*, I have, in a place riſing much higher than the ſea, obſerved pieces of green ſtones inſerted in ſuch as were white; and in ſearching the ſhores of that iſland, I obſerved that towards the north, green ſtones were formed by means of an herb,

which is nouriſhed in the ſea, and by its juice tinges the ſand collected there, with greeniſh colour. It is natural to think, that this herb has always grown about that iſland; that it is in this manner our green marbles have received their colour, and that at the time when theſe pieces of green ſtone were inſerted into the white, more than an hundred fathoms from the preſent ſurface of the ſea, the waves ſtill waſhed the part where I obſerved this ſingularity; that they then laboured at the fabrication of this quarry of white ſtone, to which in ſome tempeſt they conveyed theſe pieces of green ſtone detached and ſeparated from ſome other rocks of the ſame nature.

But in a great number of quarries we very commonly find herbs and plants, which are often unknown, or only grow in far diſtant countries, inſerted in ſtones, and there forming a kind of natural herbage. What a learned author* relates on this ſubject, when ſpeaking of certain ſtones, which he had found a bout *Lyons*, is too remarkable not to command your attention.

These ſtones, ſays he, are ſcaley near the beds of coal, among which they are found; and according as they are near to or far from theſe, they are more clear or leſs tranſparent, blackeſt when neareſt to them, and leſs ſo, when diſtant from them, when they are only of a greyiſh or cineritious colour.

Among the ſcales of theſe ſtones are found the impreſſions of various kinds of herbs, which are eaſily diſtinguiſhed, but do not penetrate into the ſubſtance of the ſtone—ſome ſtones in *Florence*

* *Jeſſieu* Diſſert. on the herbs, ſea-ſhells, and the other bodies found in certain ſtones at *Chaumont* in the province of *Lyons*.

are impregnated with the colour of herbs between their ſcales or flakes.

The number of theſe ſmall leaves, continues the ſame author, the facility of ſeparating them, and the great variety of plants, which I have ſeen thus impreſſed, made me look upon theſe ſtones as ſo many volumes of botany, which in the ſame quarry included the moſt ancient library in the world; which was ſo much the more curious, becauſe theſe plants exiſt no more, or if they do, it is in ſo diſtant countries, that we have not come to a knowledge of them. We are however certain, that they are plants of the capillary kind, ſuch as ſpleen-wort, polypody, maiden-hair, harts-tongue, oſmonds, and ſpecies of ferns, which approach to thoſe diſcovered by father *Plumer*, and Sir *Hans Sloone*, in the iſles of *America*, and thoſe which have been ſent to the *Engliſh* from the *Eaſt* and *Weſt-Indies*, and communicated to *Plunkenet*, in order to be inſerted in his collection of rare plants. One of the principal proofs that they are of this ſpecies, is, that as they have their fruit adhering to the backs of their leaves, the deep impreſſions of their ſeeds are ſtill eaſily diſtinguiſhed upon theſe ſtones. The multitude of the differences of theſe plants, is ſo great about St. *Chaumont*, that every quarry ſeems to be a ſource of incredible variety.

Besides theſe impreſſions of the leaves of capillary plants, I have alſo remarked others which ſeemed to have been made by palm-trees, and others of a foreign growth. I have alſo obſerved particular ſtalks and ſeeds, and upon opening ſome of theſe ſtones, I have ſeen a black duſt come from ſome vacuities in them, which was nothing elſe but the remains of the plant putrified, and includ-

ed between two beds, perhaps for more than three thouſand years.

A ſingular remark, continues he, is, that we do not find in the country any of the plants whoſe impreſſions are marked upon theſe ſtones; and that among the leaves of an infinite number of different plants, though ſome may be broken, yet none are folded; ſince they are all ſtraight as if they had been artificially paſted on. This ſuppoſes that theſe plants unknown in *Europe*, could only come from the countries, where they grow, which are the *Indies* and *America*; and that they could only be thus impreſſed and arranged in different directions, becauſe they only floated in the water, which covered the bed on which they inſenſibly fell, as they were kept extended by the water; and that the water of the ſea was abſolutely neceſſary to bring them from ſo great a diſtance.

Thus one of your greateſt botaniſts of natural hiſtorions, has expreſſed himſelf in favour of my ſyſtem. Theſe proofs of the diminution of the ſea, and of the fabrication of our ſoils or ores in her boſom, are certainly very ſtrong; but I add, that you have a demonſtration of theſe things in the ſhells and other ſea-bodies, with which the plains and mountains of our globe are interſperſed.

You have no doubt ſeen, continued our philoſopher, ſome ſtones of *Syria*, full of ſmall petrified fiſh; (at the ſame time he pulled two or three of theſe ſtones out of his pocket) obſerve, continued he, the form and the diverſity of theſe ſmall fiſh; they are abſolutely the ſame with thoſe catched at preſent on the coaſt of *Syria*; and the quarries from which I took theſe ſtones, are two days

journey distant from that sea, and considerably higher than its surface. These stones are found in two different quarries, separated from each other about four or five leagues, as we may reasonably suppose from their diversity of colours. Now these small fish could only be thrown into and buried in the petrified sand, in which they are found, by the waters of the sea, and at a time when they still covered these places.

Observe, I pray you, that all the fish are found between the beds of the stone, which are situated horizontally with the sea, as well as all other extraneous bodies found in the composition of the stones and marbles of our mountains. This observation is of great importance, since it is a proof, that these bodies have fallen, or have been thrown and conveyed to the parts where they are found, at the time when these places were beds of the sea; and that all the stone and marble which cover them at present, have been afterwards collected *Stratum super Stratum*, between which we find every where in the universe shells and sea-fish, some whole and others broken: Of this kind I could recount to you a thousand singularities, which have been discovered in the quarries and mountains of my country; but that I may quote nothing of this kind, the truth of which is out of your reach, or of which you are not perhaps already convinced, I shall content myself with mentioning the following facts.

In travelling through the mountains which run along the *Moselle*, I entered a valley to the right, between *Metz* and *Thionville*. Curiosity had drawn me thither to view an iron mine, in which the labourers were at work; higher up near a vil-

lage called *Moyeuvre*, ſituated between two very high mountains, in the middle of which is a rivulet which works the forge. I entered the mine of the quarry which is very near the forge; the vein or bed of this quarry, which is almoſt ſix feet thick, not only extends itſelf horizontally under one of theſe mountains, to the height of two or three fathoms above the rivulet, but alſo runs to a ſimilar height and thickneſs under the oppoſite mountain, and all thoſe contiguous to them, whether ſeparated from them by deep valleys or not. I again found the ſame mine, and at the ſame height, under the mountains of *German Lorraine* beyond the *Moſelle*, and under other mountains of *Baſſigny*, and the adjacent countries; that is to ſay, at the diſtance of more than thirty leagues. It is not to be doubted, but the ſo equal bed of this vaſt mine is a depoſition which the waters of the ſea formed in theſe parts before all the mountains, with which it is covered, began to be formed.—This is evinced not only by the vaſt extent of this mine, whoſe bounds are not as yet known, or the quality and thickneſs of its bed, which are the ſame in all places where it is diſcovered, but alſo by the infinite number of ſea-adders, and ſhells of corneamons, found petrified in that ferruginous mud or ſoil.

How could theſe animals be petrified under theſe large and thick mountains, in the muddy ſand which compoſes this mine, if they had not lived and multiplied there? But how could they live there, except at a time when this mud, as yet liquid, was not buried under the weight of the mountains which cover it? ſo that it left to theſe animals the liberty of reſpiring the air, which is always mixed with the water, and the means of multiplying in that mine, then pervious to, and

habitable by them. This firſt matter was ſucceeded by all the reſt, of which the different beds of this mountain are compoſed, from this mine to their very ſummits. It is alſo to be obſerved that in theſe beds we find a vaſt number of other ſhells, eſpecially about *Thionville*. The ſtone there uſed for making the beſt lime, aed compoſed of a mud different from that of the iron-mine, is alſo full of ſea-ſhells, which certainly render the lime much ſtronger than it would otherwiſe be.

I have alſo ſeen the rib of a whale in the ſteep rock, on which the fortreſs of *Porto Hercole* is built. This rib was ſhewn to *Philip* V. of *Spain*, when his gallies went into that port, to convoy him from *Naples* to the dutchy of *Milan*.

But though the mountains and quarries of *Europe*, like ours, include numerous teſtimonies of the manner in which they have been formed, yet I find no where ſuch a quantity of them as in the mountains and repoſitories or public buildings of *Switzerland*. The repoſitory of Mr. *Scheuchzer* at *Zurich* is adorned with a prodigious number of ſtones, in which petrified fiſh of various kinds are to be ſeen; in one of theſe ſtones there is a petrified feather. I from that country brought ſeveral, which I broke off from ſome mountains, and which include various kinds of fiſh. I have a very ſingular ſtone which I found in my paſſage to *Malta*, when I viſited a quarry at the bottom of the port; it includes the fin of a large fiſh, which a ſtroke of the wedge ſo happily divided through the middle, that it is ſeen entire in both parts of the ſtone in which it was buried. The quarry in which I found theſe two pieces was more than thirty fathoms above the preſent ſurface of the ſea, and thirty fathoms of it were already conſumed, as might be

eaſily known from the reſt of the top of that mountain. Thus this fin was buried in the center of that maſs ſixty fathoms higher than the ſea.

Besides theſe ſenſible teſtimonies of the fabrication of our mountains in the ſea, you have alſo in their ſurfaces evident proofs, that the higheſt of them have been long buried under the waves, as a great many others are at preſent. Mount *Pelare* in *Switzerland*, ſituated in *Lucerne*, ſupports another very high mountain, called in the language of the country, the *Field of the Ram*, on which we ſee very large rocks, whoſe whole ſubſtance is compoſed of petrified ſea-ſhells. In conſidering them we cannot doubt but the ſea has formed them, as it ſtill forms others of the ſame kind in a thouſand parts of theſe coaſts, by adding, during whole ages, ſhell after ſhell, and uniting them to each other with ſand and ſalt, which ſerves as a cement to them. There are rocks of this kind in all the large mountains on continents, in the *Pyrenean* mountains, and thoſe of *China* and *Peru*. We find the ſame diſpoſition in all countries where there are high mountains, though it is more remarkable in ſome parts than others.

We almoſt every where find upon the declivities of the mountains, ſea-ſhells which adhere to them, eſpecially in parts which the wrecks of the rocks and earth have covered and ſecured from the injuries of time. We alſo find there a kind of fiſh*, ſtill adhering to the ſtones†; and pipes formed by

* Madrepores,

† I had the honor ſome years ago to preſent to the academy true Madrepores, ſtill united to their rock, which I had ſeparated from the earth at *Chaumont*, near *Giſors*: As alſo ſome petrified plants, which only grow in the bottom of the ſea, and which are the moſt certain marks we can have that this part of

certain ſea-worms which include themſelves in them. This infallibly proves, that theſe places have formerly been beds of the ſea, in which theſe worms are only produced. We alſo find corals petrified, and ſtill adhering to the rocks, which alone can produce them in the ſea. Some of theſe we find buried in the ſubſtance of mountains, and making a part of their petrification, which is an infallible proof of the preceding ſtate of the places where theſe bodies are found.

The muſhrooms with branches uſed by the inhabitants of the *Guadaloupe* for making lime, or a kind of ſea-tree which is only produced in its boſom, or on very ſhallow coaſts. They grow very quickly, and ſpring up from their former trunks, when cut by thoſe who ſearch for them. This petrified tree, like all the other ſea-trees, has its trunk ſometimes a foot in diameter, and is no ſooner raiſed above the ſoil in which it grows, than it is inflated on all ſides, like a fungus or muſhroom, juſt as the oak does when it is planted in a bad ſoil. From this fungus ariſe ſeveral branches in the form of flat fingers; and theſe fingers ſend off others of the ſame figure. The fibres of the trunk are perpendicular, and thoſe of the fingers horizontal. As in digging the earth of *Guadaloupe* and the continent adjoining, we find a great many of theſe trees ſtill ſtanding, ſome whole, and others broken; ſo it is certain, that the ſea in which they have been produced, once covered the places in which they are found; and that conſe-

the continent was formerly a part of the ſea.——————Mr. *Billeret*, profeſſor of Botany at *Becancon*, ſent me ſome pieces of rocks taken from the quarries of *French Compte*, on which were found ſome of theſe pipes formed by certain ſea-worms which lodge in them, and ſuch as in our ſeas we find on the rocks which produce the coral.

quently its waters are diminiſhed in proportion to the height of theſe places above their preſent ſurface.

But of this kind I have ſeen nothing more ſingular or worthy of attention, or inſtructive, than the banks of oyſter-ſhells with which ſeveral mountains of *Tuſcany* are covered, eſpecially thoſe of *Piſa*, becauſe they are in the neighbourhood of the town of that name. Some of theſe banks are two or three miles in extent, and covered with earth or ſand three or four feet deep, which the winds have conveyed thither ſince theſe hills roſe above the ſea, and the ſhells which have been detached from theſe banks by the rain, or by any other means conveyed into the neighbouring fields, cover all the adjacent grounds, juſt as ours are covered with pebbles and flints. Father *Feuille* who went to *America* to make his obſervations, aſſures me, that he has ſeen ſuch works of the ſea, in the mountains of *Peru*. A celebrated *Engliſhman* told me, that he met with ſome of them in the mountains of *Virginia*. They are alſo found in the country of the *Acaoukas* in *Miſſiſſippi*, a hundred and fifty leagues from the ſea-ſhore. There are ſome of them found in *France* about ſixty leagues from *Bourdeaux*, in the pariſh of St. *Croix du Mont*, between *Cadillac* and *St. Macaire*, about ſeven or eight hundred paces from *Garonne*. There, on the top of a pretty high mountain, which riſes among others, from which it is ſeparated by vallies, we find between two beds of ſtone, the uppermoſt of which is five or ſix feet thick, a bed of oyſters twenty or twenty-four feet thick, and extended about a hundred fathoms which were viſible, the reſt being hid in the rock. In this the inhabitants have hewed out a chapel fifteen feet high, in which they celebrate the maſs. Moſt of

these oysters are close, and contain a small quantity of argillacious earth, which is certainly the substance of the oyster dissolved. These oyster-shells are united in the bank by a sand, which being mixed and petrified with them, at present forms but one common body. The literati of *Bourdeaux*, who are so assiduous in preparing a history of the earth*, can certainly give you an account of the manner in which this bank was formed, if the prejudices of education do not hinder them from discovering the reason of this phænomenon. For my own part, I think it is certain from the view of these banks of oysters, especially those in the hills of *Pisa*, which are so numerous, so large, and only covered with a little sand, that they were all beds of oysters when the sea covered them totally, like to those which it includes at present in the numberless places, and from which we take the oysters we eat.

A great many other countries of our globe furnish evident and uncontroverted testimonies, that the sea has been higher than it is in its present state, and that it has long covered our rising grounds. We were then sitting on the mountain of *Mokatan*, at the foot of which *Grand Cairo* is built. This is the place where *Herodotus* says, in his time, there were rings of iron to be seen in the stones, to which the ships which arrived at *Memphis* were tied. Three miles hence, continued our

* At *Bourdeaux* the literati are preparing to publish a history of the earth, and of all the changes which have happened to it, as well general as particular, whether by earthquakes, inundations, or other causes, with an exact description of the different progresses of the sea and land, of the formation and disappearance of islands, rivers, mountains, vallies, lakes, gulphs, straits, capes, and all their changes; with the physical cause of all those effects. *Journ. des Scavans. Mars* 1719.

philoſopher, and in this long tract of mountains, which terminating at that city, extends to the Frontiers of *Abyſſinia*, there is a long valley, which by a gentle declivity conducts the traveller in three days time to the *Red Sea*. This valley, which is a mile, and in ſome parts two broad, has its bottom covered to the height of ſeveral cubits, with ſhells of all kinds, from its entrance to the ſea ſhore, where they are daily multiplied more and more. What can we conclude from this, if not that theſe ſhells have been collected by the waves, and heaped up in this valley; and that the ſea has left them there ſucceſſively, in retiring within the boundaries in which we now ſee it. How, without ſuppoſing a very long continuance in, and a real ſuperiority of the water to theſe places, in which we find theſe ſea-bodies, can we account for the collections which are made of them in all parts of the world?

About half a league from *Francfort*, on the other ſide of the *Main*, there is a mountain called *Saxenhauſen*, whence ſtones are dug, the whole of the ſubſtance is compoſed of ſmall petrified ſhells. Theſe are united by a fine ſand, which forms a very hard ſtone, of which the ſtrong walls of that beautiful city are built. Moſt of theſe ſhells include their reſpective fiſh, which are alſo petrified. At *Vaguine*, a ſmall town in *Provence*, we find another mountain full of ſea ſhells and large oyſters, ſome of which are ſtill alive. The fields adjacent to *Havre-de-Grace* are full of oyſter-ſhells; which are alſo to be met with in a great many parts of *France*. There is a bank of ſea-ſhells at *Iſſy*, near *Paris*; *Tuſcany* contains a prodigious number of them, beſides thoſe I have mentioned to you; in a word, there are numbers of them to be found in all parts of the world.

How then can we doubt but this globe which we inhabit is the work of the ſea, and has been formed in its boſom, in the manner that ſimilar compoſitions are ſtill produced under her waters, as we ſee with our own eyes on ſhallow coaſts, and as the divers aſſure us? Theſe in the bottom of the ſea obſerve mountains, vallies, plains, ſteep places, and even ridges of mountains, ſuch as in ſome parts, of our continents, extend to three, four, or five hundred leagues in length. That ridge, ſo well known in *Europe*, which begins at the peninſula of *Jutland*, and reaches more than three hundred leagues, under the waters of the ſea, which are ready to let it appear above their ſurface, is an authentic teſtimony of what I advance. It convinces us, that as the formation of theſe ridges of ſubaquatic mountains, is the effect of two oppoſite currents which have raiſed a heap of ſand or mud between them, ſo the long mountains on our globe, have been formed in the ſame manner, while the ſea covered them. The ſea-ſhells and fiſh which theſe mountains include, and the poſition of theſe ſea-bodies always laid flat, leave us no manner of room to doubt of it. It is thus, that the mountains which bound the plain of *Antioch* from eaſt to weſt, as far as *Tartary*, have been formed between two currents flowing from the ſouth and north, while theſe mountains have been ſeparated by a third, which cutting theſe from the eaſt to the weſt, has digged and preſerved the valley obſervable between them. This is eaſily diſtinguiſhed from the top of the caſtle of *Antioch*, whence we diſcover the place through which this current flowed from the *Mediterranean*, and the road it kept in its way to *Tartary*.

These ridges of mountains are often formed in another manner by double currents; for the one,

for example, running from the eaſt to the weſt, and the other from the weſt to the eaſt, form between them a ridge in their proper direction, according to the diſpoſition of the bottom of the ſea. It is in this manner, that the current which runs from the ſtraits of *Gibraltar*, towards the eaſt along the coaſts of *Barbary*; and that which runs from the eaſt through the mouth of the *Dardanells*, and terminates in the ſtraits, going along the coaſts of *Morea*, *Italy*, *France* and *Spain*, have formed the iſlands of *Yvica*, *Majorca*, *Minorca*, *Corſica*, *Sardinia*, and *Sicily*, almoſt in a right line, as we ſee them in the maps and charts.

You no doubt conceive, continued our philoſopher, that in roads, ſo long as from our *Mediterranean* to *Tartary*, and from the ſtraits of *Gibraltar* to the fartheſt part of the *Mediterranean*, the waters of theſe currents received impreſſions, which ſometimes make them deviate from a right line; that a part of their waters is alſo detached, runs through the mud and ſand, which it ſeparates, and by which its beds are encloſed; and that theſe ſmall currents detached from the large ones, inſinuating themſelves into theſe collections of ſand and mud, form particular roads for themſelves in them. Theſe are the vallies and inequalities which you obſerve in your mountains, and which you find equally in thoſe which the ſea ſtill includes in her boſom. The ſeparations of our mountains, and the vallies by which they are cut, ſhews the various roads which the currents of the ſea kept, when covering them totally ſhe laboured at their fabrication, and point out to us the manner in which they have been formed. The flux and reflux of the ſea, going into the ſtraits between certain mountains, or into mouths of rivers, and returning immediately, teaches you the manner in which val-

lies have become deep, and by what means the waters of the ſea have formed the courſe of rivers and brooks. This is one of the nobleſt ſtudies, to which we can apply, and I hope your literati, eſpecially thoſe belonging to academies in ſea-coaſt towns, after having well conſidered the diſpoſition of the mountains, will give us the hiſtory of the formation of our globe by the currents of the ſea; with a juſt deſcription of its exterior parts, and an exact plan of the earth uncovered.

For in order to deſtroy this truth, and elude ſo many facts, which infallibly eſtabliſhed it; it is to no purpoſe, Sir, with ſome of your authors, to oppoſe to me the hiſtory of the univerſal deluge, which you pretend has covered the whole face of the earth. In order to confute this opinion, it is evident that one of the moſt learned doctors of your church,* grants that ſo conſiderable an event was abſolutely unknown to the *Greek* and *Roman* hiſtorians. *Joſephus* † aſſures us that *Beroſus* the *Chaldean*, *Nicholas*, *Damaſcenus*, and *Jerome* the *Egyptian*, had ſpoke of it nearly in the ſame manner as *Moſes* did. But muſt the fact paſs for manifeſt? Is it aſtoniſhing that *Beroſus* and the others who lived in the eaſt under the empire of the *Macedonians*, at a time and in a country where the *Jews* were ſo well known, ſhould inſert into their hiſtories, what the *Jewiſh* books contained on that ſubject? I add, that even the circumſtances re-

* Quanquam Ogygius ipſe quando fuerit, cujus temporibus etiam diluvium magnum factum eſt (non illud maximum quo nulli homines evaſerunt niſi qui in arca eſſe potuerunt quod gentium nec Græca, nec latina, novit hiſtoria) ſed tamen majus quam poſtea, tempore Deucalionis fuit inter ſcriptores hiſtoriæ non convenit.

Auguſtin. de civ. dei, lib. 18 cap. 8.

† Antiq. Jud. lib. 1. cap. 3.

lated by thoſe hiſtorians, convince us how little we may depend upon their veracity, if it is true that they have wrote what other authors repreſent as their opinions: In a word, the paſſage which *Joſephus* quotes from *Beroſus*, mentions the remains of the ark, which, ſays that author, are to be ſeen at preſent, on a mountain in *Armenia*, and of which pieces are carried off by way of reliques or ſacred memorials: I grant, ſome ignorant *Armenians* are ſtill of this ridiculous opinion, with reſpect to the remains of the ark. But, it is ſufficiently certain, that our moſt judicious travellers readily grant, that this is no more than a childiſh fable; that *Mount Ararat* on which the ark was ſaid to land, is perpetually covered with ſnow, and ſo inacceſſible, that it has never been poſſible to go half way to its top. It is therefore evident really that we could never know whether the ark reſted on that mountain, or whether there are any remains of it there, unleſs we ſuppoſe that ſome favourite of heaven has learned the mighty ſecret by a particular revelation from God, which is not as yet proved.—Beſides, the inhabitants of the country have a tradition with reſpect to Mount Ararat, which is by no means compatible with what the *Jews* relate concerning the deluge: They ſay, that *Noah* ſaved himſelf in the ark, together with twenty-nine perſons; and that the town of *Tamanin*, ſituated at the foot of this mountain, has taken its name, which in the *Arabic* ſignifies fourſcore, from the number of perſons which came out of the ark, and ſettled in that part.

Beſides, it is as aſtoniſhing that the *Greeks*, who ſo greedily ſwallowed every thing that was marvellous, and the *Romans* who were ſo dextrous in diſtinguiſhing truth from fable, and who have tranſmitted to us the memory of the deluges of

Oſiris, *Ogyges*, and *Deucalion*, have not ſpoke a ſingle word of the univerſal deluge, which is ſaid to have ſwallowed up all mankind. Is it conceivable, that an event ſo remarkable and ſo terrible, ſhould be aboliſhed from the memory of men, who had been preſerved from it, and from the memories of all their poſterity, to which a degree, that neither the *Indians* nor the *Chineſe*, whoſe hiſtories are ſo ancient, and even before the *Epocha* you aſſign to this deluge, nor any other nations of the world, have preſerved the leaſt remembrance of it; ſo that an event which equally intereſts all mankind, is not to be found in the traditions of any country or nation, except in that little corner of the earth inhabited by the *Jews*, a people whom hiſtory and experience prove to have been, and ſtill to be during their humiliation, the vaineſt and moſt credulous mortals in the univerſe.

SHALL I add to this general ſilence of the nations, with reſpect to ſo important and ſo ſenſible a fact, that it is not poſſible to conceive whence in forty days this prodigious quantity of water could come, capable of raiſing the ſea from where it is at preſent, to the height of forty cubits above the higheſt mountains of the world; that neither can we comprehend where this immenſe quantity of water retired in ſo ſhort a time, ſince I defy any man to prove that a collection of water capable of covering our higheſt mountains, could find room in the center of the earth, ſince the contrary is eaſy to be demonſtrated; that in a word, it is equally inconceivable, that in a few months thoſe waters could be diſſipated, ſince in order to make them ſink three or four feet, ſome thouſands of years are at preſent requiſite, as I ſhall afterwards ſhew. Is it not from this natural to conclude, that in order to ſupport this opinion of the univerſality of the

deluge, we muſt have recourſe to a miracle, and ſay, that God after having drawn this prodigious quantity of water from nothing, he afterwards annihilated it, which is abſurd? For why ſhould the Almighty take ſo much unneceſſary pains, why furniſh out ſo ſumptuous an apparatus, in order to deſtroy a race of ſinful mortals? Could he not have annihilated them by a ſingle act of his power, or a word of his mouth? Beſides, continued our philoſopher, this fact is contradicted by your own ſacred books: Do not theſe tell us, that the deluge was the effect of a ſimple rain, which laſted only forty days, and which could not conſequently be equal to thoſe which fall for five months in *Abyſſinia*, and in ſome other countries of the world? Do they not add, that theſe waters only retired by little and little*, which only denotes the ſucceſſive effects of natural cauſes, and not a ſudden prodigy wrought by the omnipotence of God.

You are provoked, continued Telliamed, and no doubt take it ill, that I ſhould ſo powerfully attack a tradition, authoriſed by your ſcriptures.—However, if you will but beſtow a little attention, you will grant that my ſentiment, with reſpect to this ſo famous truth, is by no means oppoſite to what is taught you by thoſe books which you look upon as ſacred; that theſe words *the whole earth*, which they uſe in order to denote the ſpace of land covered by the deluge, may be equally underſtood either of the whole globe, or only one part of it;

* "All the fountains of the great deep were broken up, "and the windows of the heavens were opened. And the "rain was upon the earth forty days and forty nights. And the "waters returned from off the earth continually, and after the "end of the hundred and fifty days, the waters were abated." *Gen.* vii. 11, 12. and chap. viii. 3.

for example, of that country in *Aſia* inhabited by *Noah* and his family; that in reality they have been underſtood in this ſenſe by many of your literati, who have not thought themſelves obliged to acknowledge this univerſality, which is by ſome maintained in oppoſition to all the powerful arguments againſt it; that your ſcriptures themſelves favour this laſt opinion; becauſe, from every thing they contain, it is evident that *Moſes* had only an intention to write the hiſtory of the *Jews*, and by no means that of other nations. So that we may ſay with him, that the deluge of which he truly ſpeaks, really covered *the whole earth*, that is, the whole country inhabited by *Noah* and his neighbours; that we cannot beſides underſtand that writer otherwiſe, without giving the moſt abſurd explication to his words; that when he ſays, for example,† *all fleſh died that moved on the earth*, it is impoſſible to underſtand theſe words of the fiſh, who came not out of their element during the deluge; that it is equally abſurd and ridiculous to think, that all other created beings periſhed in this general inundation, and only perpetuated themſelves by the care which *Noah* took to preſerve them in the ark; ſince in order to ſupport this fable, it is neceſſary to admit that he took along with him not only Elephants, Rhinoceros, Camels, and other large or monſtrous animals, which muſt take up a great deal of room in ſuch a ſmall place; not only fleas and bugs, and other very incommodious vermin; but alſo hand-worms, and a thouſand other animals, which though ſmaller than the hand-worm, yet exiſt in nature. In a word, that as the deluge of *Deucalion* paſſed among the ancient *Greeks*, as yet ignorant, for univerſal, though it only happened in *Greece*; and as according to your

† "All fleſh died that moved upon the earth. *Gen.* vii. 21.

own books, after the burning of *Sodom*, the ſons of *Lot* imagined that their father was the only man alive, it would be by no means aſtoniſhing, if *Noah*, ſaved with his family from a deluge which had inundated all his country, ſhould believe that this deluge had really covered the whole face of the univerſe.

But even admitting your ſyſtem, with reſpect to this ſubject, I affirm, that it cannot account for every thing, which in our globe evinces the inſenſible fabrication of our ſoils, and of the different materials which the ſea has employed in their formation. What you have ſaid of this deluge, has engaged me more narrowly to examine the mountains of *Armenia*, on one of which you pretend *Noah's* ark ſtopped. Now I have obſerved, that theſe mountains, as well as any others in the world, contained in their entrails the bones of ſea-fiſh, ſhells, and other matters extraneous to their ſubſtance, all laid flat and horizontal, as they are elſewhere, which is an infallible proof that they have not been inſerted there in the time of the deluge.

In a word, if the inſertion of ſuch extraneous bodies in theſe enormous maſſes, muſt be attributed to this great event, is it not certain, that they would be placed there with confuſion and in all directions, the ſhort duration of that deluge, not having permitted them to fall naturally flat and horizontal to the globe? Beſides, in order to comprehend that theſe extraneous bodies have penetrated into theſe mountains, we muſt ſuppoſe either that theſe entire maſſes were formed during the ſhort duration of the deluge, which is impoſſible, and even contradicted by your ſcriptures, which ſuppoſe that they exiſted before; or we muſt ſay, that theſe mountains muſt have become ſo ſoft

that ſuch bodies could enter into them. Now, I aſk you, if it is not abſurd to think ſo? Whom will you perſuade that the waters, however abundant you ſuppoſe them, were able in ſix or ſeven months to penetrate, ſoften, and liquify, a rock of marble or ſtone, four or five hundred feet thick? For theſe extraneous bodies are found in the boſoms of the mountains, as well as in other parts of them. To produce ſuch an effect, would not a new miracle be neceſſary? Beſides, at the end of the ſeventh month of the deluge, did not the ark remain on the mountains of *Armenia?* Did not the dove bring back an olive branch to *Noah*, as yet ſhut up in the ark? Theſe mountains were not then ſoft and fluid maſſes, ſince they were capable of ſupporting ſo clumſey a machine as the ark, and bore olive trees, which we know are long in growing.

But let us return to the proofs of the diminution of the ſea.

Egypt, in which we now are, has furniſhed me with a very ſingular, and in my opinion, a very convincing kind of proofs. About two or three days journey from the *Nile*, on the ſide of *Lybia*, and in the deſarts which terminate *Egypt* towards the eaſt, we find ſeveral ruins of conſiderable towns. The ſands under which they are buried, have preſerved the foundations, and even a part of the edifices, towers, and fortreſſes with which they were accompanied; and as in theſe places it never rains, or at leaſt very little and rarely, it is probable that theſe remains will ſubſiſt there for ſeveral thouſand years. Theſe deſtroyed towns are ſituated nearly in a line, from the north to the ſouth; or if you will, from the *Mediterranean* towards *Nubia*. They

are, as I have ſaid, two or three days journey diſtant from the habitable parts of *Egypt*, and reach as far into the deſarts. Their diſtance from each other is two, and ſometimes three days journey.

If you conſult the *Arabian* authors who have wrote the hiſtory of *Egypt*, or liſten to the traditions of that country, with reſpect to theſe ruins, you will find that they are the remains of ſeveral towns built either by the magi, or by princes who wanted to ſignalize their power by making choice of ſo extraordinary ſituations for colonies: or perhaps theſe towns were built as ſo many ſhelters from enemies, ſince they are in places almoſt inacceſſible by large armies. It would be eaſy to ſhew the impoſſibility and folly of building towns in places two or three days journey diſtant from an inhabited land. Such towns could not have been built, nor could the inhabitants have lived, without an incredible expence, ſince it would have been neceſſary to have carried even water to them, and ſince by the ſmalleſt interruption of the *Egyptian* caravans, the ſettlers muſt have died of Hungar and thirſt. Beſides, the inhabitants of theſe towns, which from the extent of their ruins muſt have been very populous, could not have had any commerce for their ſupport, unleſs we ſuppoſe that the ſea once bordered upon them.

Independently of theſe conſiderations, let us examine the ſituation of theſe towns, beginning with that in which the temple of *Jupiter Ammon* was built in the time of *Alexander*, and the *Romans*: By doing ſo we ſhall evidently find, that they have ſucceſſively been the ſea ports of *Egypt*. The city and ports of *Alexandria*, have ſucceeded the city and port celebrated on account of the temple of *Jupiter Ammon*. This city ſucceeded the next to

it in going towards *Nubia*; and the reſt ſucceſſively followed each other. As a proof of this, we obſerve before all theſe ruins, towards the north and the *Mediterranean*, the places which have ſerved them as harbours. Theſe harbours are not ſo totally deſtroyed but that we may eaſily diſtinguiſh the form and extent of them. I do not doubt but if we were to dig into the ſand, with which theſe harbours are in a great meaſure filled, we ſhould find the remains of a good many ſhips: But I had neither men, victuals, nor water enough for undertaking a taſk which might have been longer than I was aware of.

The poſition of theſe ruins is always higher than the harbours, which are almoſt all ſurrounded with rocks, except in ſome places where the entries of the harbours have certainly been. Before ſome of theſe ruins we ſee grounds raiſed as high as themſelves, with ſome remains of buildings. Theſe were probably iſlands contiguous to the port. Theſe cities could ſerve for no other end than that of ſea-ports, neither was it poſſible that their inhabitants could ſubſiſt without the aid and aſſiſtance of the ſea. They could only be employed in commerce, and could not receive the neceſſaries of life, but by means of ſhips which brought them from the mouth of the *Nile*, then much higher than the place where they are ſituated.

In proportion as that city, which was next to *Nubia*, was left by the ſea, there was another built nearer the ſhore in the place moſt proper for the reception of ſhips. We meet with the ſecond of theſe ruined cities, in deſcending through the deſart of *Nubia* to the ſea. This is ſucceeded by a third, which was ſucceeded by that in which the temple of *Jupiter Ammon* was built. This laſt was ſuc-

ceeded by the city and port of Alexandria, which receives the ſhips coming to *Egypt* on the weſt of the *Nile*, as *Damiette* receives thoſe which arrive on the eaſt: But in a little time this port, already half filled, will oblige the merchants to forſake it, and look out for a new harbour, in conſequence of the ſucceſſive diminution of the ſea. Riſing grounds on a coaſt already ſhallow, will at laſt appear entirely dry; and I am perſuaded that in two or three thouſand years, *Alexandria* will be farther from the ſea-ſhore than the ruins of the temple of *Jupiter Ammon*, in which we only find a few ancient burying-places. The fine churches of Alexandria converted into moſques are, as you very well know, the only edifices within the new walls which for ſix or ſeven hundred years have encloſed that city. The houſes are built on the ſand, which for two or three hundred years has filled up a large part of the harbour.

The greater and the ſmaller *Syrtes*, ſo renowned in *Roman* hiſtory, and both ſituated on the ſea-ſhore about ſixteen or ſeventeen hundred years ago, are now at a great diſtance from it. This, indeed, happens on account of the ſhallowneſs of all the *African* coaſt, as well as of the diminution of the ſea. If you go into the deſarts contiguous to this coaſt, or into *Egypt*, you will find the remains of numberleſs cities and harbours. The appearances of ports and the veſtiges of the buildings which ſurrounded them, are to be found in a hundred places. Ships* petrified entirely or in part, and found thirty or forty days journey from the ſea, as well as in places nearer it, numberleſs ſhells mixed with the ſand of the deſarts, or adhering to

* Veſſels and boats of every kind, were formerly called ſhips.

the rocks and mountains, vallies at the feet of the mountains alſo covered with ſhells, and the whole beds of ſhells in other parts, are infallible proofs, that the ſea once covered theſe countries.

In a word, if the ſea had not been ſuperior to them, if ſhe had not once overflowed the ſcorching deſarts of *Lybia*, could we find theſe traces of her abode ſo diſtant from herſelf, eſpecially ſuch a number of ſea-ſhells, with which theſe deſarts abound, or which adhere to the rocks in that country? Have we ever to this day perceived even land-ſhells produced in places which at preſent have ſo little humidity for their nouriſhment and ſupport?

Visit, Sir, continued our philoſopher, the little hill ſituated to the ſouth-eaſt of the largeſt of the pyramids, ſuperior to their baſis by ſome fathoms, and only two or three hundred diſtant from them, and you will find upon its ſummit, numberleſs ſhells and other marks of the ſea. The deſart at the entry of which this hill and the pyramids are ſituated, is that which conducts to *Lybia*, and its dryneſs, notwithſtanding its contiguity to the *Nile*, is as great as that found in its fartheſt extremities.

The names of a great number of places, which the ſea has covered there, as well as in all the other parts of *Africa*, are evident proofs of my doctrine, among the people now moſt contiguous to theſe deſarts. Thus they ſay the ſeas of *Barca*, *Borneo*, *Cyrene*, and *Jupiter Ammon*, in order to give proper names to the beds or channels in which theſe ſeas once ran, geographers themſelves retain theſe very names in their charts and maps, ſince they are ſenſible that they have preſerved them ever ſince they have been left by the waves of the ſea. In

the hiſtory of the firſt and ſecond ages of *Mahometiſm*, we are informed, that a canal was dug from the port of *Cairo* to the *Red Sea*, through which, by the aſſiſtance of the *Nile*, proviſions were conveyed to *Mecca* and *Arabia*; of this canal we have at preſent no remains. We only find at the extremity of the *Red Sea*, the end of a canal dug in a rock, the reſt of which is covered with ſand. Whether this is the canal mentioned in hiſtory or not, yet ſtill it is certain that when it was dug, the ſea was by ſome feet ſuperior to its bottom, which is at preſent a great many feet ſuperior to the ſurface of the ſame ſea; which is an evident proof of the diminution of the latter. Beſides, veſſels which arrived at *Swez* fifty years ago, are now obliged to land fifteen or ſixteen miles from that port. We are even ignorant where the city and port of *Colzum* ſtood, which the firſt hiſtories of *Mahometiſm* have mentioned, and which then gave their names to the extremity of the *Red Sea*.

It is a pity that *Nero* did not finiſh the canal he began to dig between *Epirus* and *Morea*. This would have been a ſenſible and remarkable proof of the diminution of the ſea, which he intended ſhould paſs through that channel. There are, however, in your hiſtories, as well as ours, continued our ingenious *Indian*, a great many inſtances of ſimilar works carried to their full perfection, though we have but little attended to the cauſes of their abolition, or the ceſſation of their uſes.—Some time there will be a paſſage from *France* into *England*, and from *Spain* into *Africa*, on dry ground, when perhaps thoſe who thus paſs, will be as ignorant of the diminution of the ſea, as we are at preſent, in travelling over countries which heretofore were ſeparated by ſeas leſs deep. How many iſlands

have been thus united ? And by this means how often have our continents been enlarged ? The union of one ſpot of ground to another, is the real conſequence of the diminution of the ſea : But as this work is long and inſenſible, we are but little acquainted with it, or with the cauſe which produces it, becauſe we are ignorant of the ſtate of places already effaced from the memory of man.— How much will people be aſtoniſhed, when by the exhauſtion of the ſeas which run from Spain to America, they find *Mexican* piaſters and ingots of gold and ſilver in the grounds which theſe ſeas have left. Some of theſe ſubſtances will be found in the ſtones dug from the mountains in order to build houſes. In theſe ſtones there will be emeralds, pearls, diamonds, and ſuch precious ſtones as are commonly brought from the eaſt, and have been loſt with the ſhips which were daſhed to pieces in their paſſage between our coaſts and the American ſhores. We ſhall there even find entire ſhips, and if braſs and iron were not ſubject to ruſt and be conſumed, we might there find braſs and iron cannon, the uſe of which our poſterity may not perhaps then know : But they ſhall obſerve their forms as it were ſunk into the ſtones, and what will appear ſtill more ſurpriſing, they will diſcover the impreſſions of the coats of arms of our braſs cannon.

How, ſir, ſaid I, on this occaſion, is it poſſible that in plains far diſtant from all continents, plains which at preſent are covered by the ſea, and in which there are neither rivers nor dry land, there ſhould one day be inhabitants ? How is it poſſible that in ſuch places there ſhould be cities built, or that the boſoms of the mountains ſhould be opened in order to furniſh the materials proper for building towns ? Granting it was poſſible (as you

intend to perſuade me) that the immenſe quantity of water, with which theſe parts are covered, was totally exhauſted, how could theſe brackiſh grounds of a ſandy or muddy ſubſtance, become fertile, habitable, and actually inhabited, without the aſſiſtance of freſh water.

Yes, ſir, replied our traveller, all this is very poſſible: it will happen as I predict it to you, and theſe plains which are now under water, will one day be as fertile, at leaſt in ſome parts, as the beſt cultivated countries in *Europe*. You muſt obſerve, ſir, that brooks, rivers, rivulets, and even the peculiar ſuſtance of our ſoils, are things accidental to our globe, and poſterior to the appearance of our firſt ground; and that the former derive their origin from the latter. Imagine to yourſelf then, that there were no rivers and brooks, when our higheſt mountains began to raiſe their tops above the waters; theſe tops were enlarged, in proportion as the waters of the ſea ſubſided, and augmenting gradually at laſt, formed ſmall iſlands. The waters which ſeparated them, continuing to ſubſide more and more, theſe mountains were united and formed a tract of land of greater extent. This which once happened in one part of the globe, afterwards happened in ſeveral others. From theſe new grounds, at firſt very ſmall, by the inſenſible and continual diminution of the ſea, have ſince ariſen theſe vaſt continents, which we inhabit, that infinity of iſlands, with which they are ſurrounded, and of which the ſea is full; theſe iſlands and theſe continents will form but one continued tract of land, when the waters of the ſea are totally exhauſted.

Whether there have been winds blowing on the ſea, or not, before our firſt lands began to ap-

pear, is a thing of no great importance to know; but there were certainly currents in the ſea, ſince it is by their means that our mountains were raiſed and our vallies produced, the matter of which has certainly ſerved to their compoſition.

As ſoon as there were grounds, there were certainly winds and rains which fell upon the firſt rocks; then there were veins of water formed, which carried back theſe rains to the ſea, whence they had been exhaled. Theſe veins became larger and longer, in proportion as the grounds became more extenſive. The veins of water formed brooks, ſeveral rivulets formed large rivers; the rays of the ſun, the heat, the cold and the winds, and the rains acting on the ſummits of the rocks, mouldered their ſurfaces away. A part of their duſt and wrecks, by the winds and rains, carried from the ſuperior to the inferior places, was there collected. Another part was by the rivulets conveyed into the boſom of the ſea, and another ſtopt at the mouths of the rivulets. Here the herbs, roots, and trees, which the ſea formerly nouriſhed in her brackiſh waters, finding a ſofter mud, received a new ſubſtance which made them loſe their bitterneſs and acrimony: Thus the plants which were before ſea-plants became terreſtrial ones.

Our naturaliſts, I know, pretend, that a transformation of our ſea productions into thoſe of the terreſtrial ſpecies, is as impoſſible as the change of certain ſubſtances into others, becauſe their eſſences are immutable. I ſhall afterwards have an opportunity of examining this point; beſides, if it is true, as we cannot doubt, that various kinds of trees grow in the ſea; that in the *Red Sea*, there grew ſeveral ſpecies of very perfect muſhrooms,

which being ſoft at firſt are afterwards petrified; that all ſeas produce an infinite number of herbs, even ſuch as are good to eat; why ſhould we not believe that the ſeeds of theſe have produced the herbs and roots which we ſee on the land, and which we daily uſe for nouriſhment. When by the reflux of the ſea, the water is very low on the coaſt of *Ireland*, the inhabitants pull from the rocks, a criſped herb which is very good to eat, and reſembles ſuccory; they ſalt it and put it up in barrels for uſe. The divers of *Chili* go three or four fathoms deep in ſearch of this herb, which they call goimon, and which they love greatly. Our criſped ſuccory has probably ſprung from this ſea-plant. It is thus, I am perſuaded, that the earth was firſt ſtocked with herbs and plants, which were before contained in the ſea. It is in this manner that the grounds left by the ſea, being watered by the rain and rivulets, daily produce new trees and plants.

In proportion then, as theſe ſubaquatic plants, of which I firſt ſpoke, ſhall be uncovered and enrich us with new ſtores, the rivers of *Europe* will alſo be daily extended; and through the uncovered lands, follow the ſea, which ſeparates them from America. The rivers of America will alſo advance to *Europe* through the lands which the ſea ſhall have left, till all theſe rivers meet with each other, or terminate in the deepeſt place and there form a lake. Such is that of the *Caſpian* ſea, into which ſeveral rivers from all parts of Aſia diſcharge themſelves. The rains which afterwards fall upon the new grounds, will form rivulets, and theſe rivulets will produce rivers, which augmenting the fertility of theſe new lands, will furniſh the neceſſaries of life to the inhabitants of theſe countries.

But before the ocean lays bare the vaſt tracts which it covers between *Europe* and America, numberleſs places ready to appear in a hundred parts of the ſea will lay a foundation for the multiplication of the human ſpecies, by multiplying and enlarging the places whence it draws ſubſiſtance.— Such are the ſhallows between *Corſica* and *Majorca*, ſuch is our *Archipelago* or the *White* ſea, which is ſo ſhallow, and numberleſs places in the *Mediterranean*; ſuch is the *Archipelago* of St. *Lazarus* in the *Indies*, the great bank of *Newfoundland*, the ſhallow ſea which ſeparates *England* from *Norway*, and thoſe which waſh the coaſts of *Germany*, *Holland*, and *France*; ſuch in the *Baltick* ſea is that ridge of mountains called the *Borneur* or *Boundary*; and a thouſand other parts which the ſea is ready to uncover to our view: The baſon of the *Mediterranean*, and thoſe of the *Caſpian* and *Baltic* ſeas, will be dried up long before the ocean affords a free paſſage by land to America.

All the rivers and rivulets which now terminate in the *Mediterranean*, will however continue to flow through the ſtraits of *Gibraltar* to the ocean, on the plains which ſhe ſhall have laid bare, till the *Mediterranean* ſea has ſubſided in ſuch a manner, that the bottom of the ſtraits has become ſuperior to the level or ſurface of her waters. The *Black* ſea will ceaſe to communicate with the *Mediterranean*, by the *Boſphorus* of *Thrace*, which is ſo ſhallow; ſo that the *Black* and *Mediterranean* ſeas, ſhall like the *Caſpian*, be no more but lakes without any communication with each other, or with the ocean. Theſe lakes themſelves, at firſt ſupplied by the rivers diſcharged into them, will like the ocean afterwards have their ſurfaces diminiſhed, becauſe theſe rivers will become ſmaller, the rains being no longer ſupported by ſo many

clouds and vapours exhaled from the ſeas, which are now more extenſive than they will be then.—In a word, is there not more dry weather at *Marſeilles*, than there was forty or fifty years ago, before on the ſide of the *Rhone* they had drained a lake which afforded more copious rains, and by that means rendered the ſoil more fertile? It is for this reaſon that it almoſt never rains in this country, nor in thoſe countries of *Africa*, which are far diſtant from the ſea, nor at *Iſpahan*, nor in the greateſt part of *Perſia*, which is without rivers and lakes capable of ballancing their diſtance from the ſea. It is for a contrary reaſon that rains are frequent in countries, which are near the ſea, or which abound with rivers and lakes from which the winds can borrow moiſture and humidity.

I doubt not, Sir, continued TELLIAMED, but you have obſerved the manner, in which on the the brinks of the ocean, the beds of thoſe rivers are formed, which run into it. The flux and reflux of the ſea firſt dig paſſages for her waters; ſhe on this occaſion, runs with violence into the leaſt elevated places, and afterwards leaving them with the ſame rapidity, ſhe preſerves roads which are ſucceeded by rivers and rivulets. This agitation of the waves being often repeated ſince the appearance of the firſt mountains, the roads which the ſea has made, ſerve as ſo many canals for conveying all the waters which fall on the ſurface of the globe to the ocean. That I may give you a known example of this truth, it is thus that the valley in which the *Seine* now runs from its ſource to the ocean, has been formed by this flux and reflux, which ſtill continues to dig it even at its mouth near *Havre de Grace*. The reaſon why the waters do not now produce the ſame effects in the rivers which flow to the *Mediterranean*, is becauſe

they are hindered from it by the barriers, which *Spain* and *Africa* have oppoſed to their flux and reflux, and becauſe the waters confined in a ſmall baſon, have not as formerly the agitation which they receive in vaſt ſeas, from the annual gyration of the globe round the ſun, and from its daily motion round its own axis. Thus the water carried in the hand in a ſmall cup, is not ſubject to the ſame motion as water carried in a very large veſſel.

It is this ſame flux and reflux, ſeconded by the winds, which towards one coaſt elevates the ſurface of the ſea, the weight of which preſſing the inferior waters afterwards, obliges them to retire with rapidity towards the oppoſite ſhore, where it produces the ſame effect. It is the ſucceſſive elevation of the waters, which this motion cauſes, ſometimes towards one part of theſe coaſts, and ſometimes towards another, which occaſions the alternate currents of all our ſeas, by which our mountains, and the vallies which continually divide them, have been formed; for paſſing with rapidity over their bottoms between collections of ſand or mud, ſometimes in one direction and ſometimes in another, they undermine and ſeparate them, compoſing theſe eminencies and depreſſions which we obſerve in them. This is the eternal work of the ſea in all places where her flux and reflux joined to the currents arrives with freedom. Theſe currents add mud to places where before there was but ſand, and carry ſand to places where before there was but mud. By this means they diminiſh in one part thoſe maſſes which they have formed, in order to augment them in another.

This is what we obſerve in our mountains already raiſed out of the ſea, and what our poſterity will find in thoſe which ſhall afterwards appear.—Such will thoſe be between which the *Seine* ſhall

afterwards flow from the *Havre*, where her waters are now discharged into the sea, to the most distant parts where her waters shall afterwards flow.—These mountains shall in no respects be different from those which run along her shores from *Paris* to *Havre de Grace*; we shall there find beds of marle, petrified mud, and indurated sand with mixtures of sea-shells, fish-bones, and other extraneous substances, as we now find in the composition of mountains, between which these are carried to the sea, which has formed them all, and continues to form the rest of them by retiring from *England* and *Ireland*.

It is in vain to object, that on the coasts of *Normandy*, the sea continually gains upon the land. Is it not evident that *Harfleur*, which formerly served as a port to the city of *Rowen*, and where we still see the towers which the sea has ruined by her billows, is already distant from the sea?—*Havre de Grace*, which succeeded it, and which has been lately built on the sand and mud which the sea had collected between *Harfleur* and herself, will not long keep its place: Art must labour afresh to form another harbour for the reception of the shipping, which from foreign countries shall bring necessaries and commodities to the inhabitants of *Rowen* and *Paris*.

Such is the fate of all maritime places; the present *Marseilles* is not situated where that of the *Romans* was placed; its port is neither that in those times, nor even that of old *Marseilles*. It is a work of art dug at the side of the former harbour, and a restitution made to the sea, of a place which she had abandoned and rendered useless by the retreat of the sea, as the old one was, while the islands of it, united to the continent on the

ſide of the old infirmaries, and deprived of the little water which ſurrounds them, will form a more beautiful one. We hardly now remember the poſition of old *Marſeilles* and its harbour, and afterwards our poſterity will as little remember the ſituation of the port of modern *Marſeilles*.

FREJUS, a port formerly ſo famous for the Shelter it gave the *Roman* gallies; and where I have ſeen the baſon in which they anchored, is another authentic proof of the diminution of the ſea. This baſon is not only at a conſiderable diſtance from the ſea ſhore, ſince there is a lake of freſh water between them, but it is alſo evident, that though all the ground which ſeparates them was removed, the ſea could not return into this baſon, to the height at which it is thought to have been in the time of the *Romans*. I even doubt, whether if by a canal, it was brought back to the walls of *Aiguemorts*, at the foot of which St. *Louis* embarked in the ſhip which carried him to the eaſt, it would be ſo high as it was ſo few ages ago. Is not *Ravenna*, another *Roman* port, totally laid in heaps, and is not this city already at a conſiderable diſtance from the ſea? the port of *Brunduſium*, is become uſeleſs, more by the diminution of the ſea, than the induſtry of the *Venetians*, who want to fill it up. Moſt of the coaſts of *Italy* and the *Mediterranean* have changed their face within theſe ſeventeen or eighteen hundred years*. Read the itineraries of the *Romans*, and compare what they ſay of the ports of *Provence* with thoſe now found there, and you will ſee, that if ſome of theſe which they mention ſtill ſubſiſt, there are a great many effaced, while new ones have appeared. The firſt being at that time very

* THE reader is to obſerve—this work was tranſlated, and firſt printed in the year 1740---and written a number of years prior to that date.

ſhallow, have ceaſed to be harbours for veſſels, either on account of the ſand which has overflowed them, or the diminution of the ſea. For the ſame reaſon thoſe which ſubſiſt are perhaps become better, while the new ones, unknown to the *Romans* have been formed in the ſame manner.

The places near the city of *Hieres*, as much as any others on that coaſt, furniſh ſenſible proofs of this truth. Between the place called the *Signal*, where it is ſaid the ſon of a count of *Provence* was drowned, and the ſea, there are, at preſent, three large quarters of a league; and the progreſs of the enlargement of this ground is remarkable from year to year, not only by the diminution of the ſea, but by the ſand and dirt, which a ſmall rivulet coming from the mountains conveys thither continually. Beſides, in this place the depth is ſo inconſiderable, that at five hundred fathoms from the ſhore, there are no more than two feet of water.

It is upon this bottom that towards the eaſt they have erected a pier, at the foot of a ſmall hill, on which an hermitage is built, running towards the iſle of *Gien*, from the north to the ſouth coaſt, and that another pier ſimilar to this, and ſituated to the weſtward of it, is built from the foot of the ſmall hill to the ſame iſland. Theſe two piers form a lake almoſt ſquare, and three quarters of a league in diameter. By this means the iſland of *Gien* is become a peninſula, and is joined to the continent. The lake, as I have ſaid, is in general no more than two feet deep. Thus by fortifying and elevating the two piers more, it would have been eaſy to draw the water out of the lake with pumps, and render it a fruitful meadow. But they thought it better to leave an aperture in the eaſtern pier, in

order to admit the ſea, which by this means communicating with the lake, makes it abound with fiſh, on account of the ſhelter which they there find in ſtorms. Now it will be upon this bottom, that by means of the ſand and dirt, every year conveyed thither in a great quantity by the torrent of *Capeaugy*, and with the aſſiſtance of the mud which the ſea carries into the lake, joined with the diminution of her waters, there will, no doubt, ſoon appear a plain with which the continent of *Hieres* will be augmented. It is in this manner, as I have been aſſured by an old inhabitant of the place, that forty other lakes at leaſt, have within theſe hundred years become beautiful meadows, and now ſerve as paſturage for flocks.

It is certainly in this manner, that all the rivers and rivulets which diſcharge themſelves into the channel, by which *England* is ſeparated from the main land, will ſome time after this, by the ſand and dirt conveyed thither, form a ſolid earth, which will gradually be enlarged till both are united. Thus after theſe ſubſtances ſhall have ſeveral times filled up the ſucceſſive harbours, *England*, by its being united with *Ireland*, will become a peninſula, and ſailors muſt go round it, from the ports of the *Lower Germany*, to arrive at the coaſts of *France*, and muſt do the ſame when they ſet out from theſe coaſts for any of the ports of *Germany*.

In a word, is it not in this manner, that the whole of *Holland* has but a few ages ago riſen out of the ſea? You will, perhaps, ſay, that the ſea daily attacks its moles: But this objection is eaſily anſwered. The *Hollanders*, by the ſea, confined, within narrow limits, have endeavoured to put her

at a greater diſtance, and have ſucceeded by means of moles erected upon her and againſt her. By theſe methods they have prevented the diminution of her waters. Thus, when the waves are favoured by the winds and tides, it is not ſurpriſing, that they ſhould break through the moles, and recover a part of the ground which had been taken from them, eſpecially, when at preſent, by importing the riches of the *Indies*, they have introduced a pernicious ſet of worms, which deſtroy the ſtakes uſed in the fortification of the barriers. The continual attacks of the ſea, are not proofs of the augmentation of the water in that part. They only evince, that we have encroached upon, and by that means prevented her apparent diminution.—Thus, it is highly probable, that the waters of the ocean, will be long dreaded by the inhabitants of the neighbouring plains, till the downs are ſo enlarged on the coaſt of *Holland*, as to form a barrier before that, which art has erected againſt their impetuoſity.

But it is equally certain, that theſe plains are daily enlarged towards the ocean. How much ſand, earth, and other ſubſtances, are by the *Tamiſe* on one ſide of the *Rhine*, and by the *Meuſe* and *Eſcaut* on the other, carried to the ſea, ſince *Holland* became a republic? Do you believe, Sir, that the port of *Texel* will laſt for ever? Does not the number of veſſels loſt every year in attempting to arrive at it, through the mountains of ſand which they are obliged to avoid, denounce its ſpeedy end? *Amſterdam* itſelf will not be long the reſidence of the merchants employed in negociating with the other cities of *Europe*, *Aſia*, and *America*. If we compare the oldeſt maps of theſe provinces and coaſts with the modern, we muſt certainly perceive that the coaſts of *Flanders* and

Holland which are contiguous to them, daily undergo alterations and augmentations pernicious to the entrance and arrival of ſhipping. *Oſtend*, which in the *Dutch* wars with the *Spaniards*, was ſo large and ſo commodious a harbour, is now good for nothing. You will perhaps object, that the *Dutch* have endeavoured to fill it up: But have the other ports of that coaſt ſuffered leſs? How much has it coſt to keep that of *Dunkirk* in ſuch a ſituation as to be of any uſe? *St. Omer*, now conſiderably diſtant from the ſea, was hard by it a few years ago.

Who can reaſonably doubt, but in time it will be the ſame with *Venice?* Very ſoon that city will be on the continent, which daily approaches it by the enlargement of the land. Several iſlands are already formed in the baſon which ſurrounds that beautiful city; and notwithſtanding the care to make it deep, the ſlime collected in it will daily render the ſea farther and farther diſtant from it.—It is already a difficulty for large veſſels to paſs the mouths of *Malamock* and enter and come out of theſe arſenals, notwithſtanding the repeated labours to keep them deep. The *Lower Lombardy* is a new acquiſition made on the ſea; and the plains of *Italy*, from *Boulogne* to the *Adriatic*, have been but for a few ages left by that ſea. The borders of *Italy* on one ſide of that ſea, and the *Roman* ground on the other, have conſiderably advanced to each other within theſe fifteen hundred years. The places near the *Baltic* on the ſide of *Germany* and *Gottenbourg*, are recent conqueſts made upon the ſea. The heaths found in ſo many parts of *Europe*, ſuch as *Germany* and *France*, are plains of ſand without any fertility, becauſe, ſince the ſea left them, they have not had time to acquire that quality; But they will, in proceſs of time become

fertile, as thoſe plains are, which are farther diſtant from the ſea. *Bauſſe* and *Champagne* were formerly in the ſame ſtate. The plains of ſand which the ſea forms at the mouths of the *Rhine*, and the plain of *Cran*, which ſhe has covered a few ages ago, will become as fertile as thoſe of *Arles* and *Languedoc*, which were once in the ſame ſituation with the former.

If you turn over the ſands of our heaths, even in places at the greateſt diſtance from the ſea, how many ſhells and veſtiges of the water in which they were formed, do you not find? If in theſe plains, you conſider the extremities by which they touch the ſea, do you not daily ſee them enlarged towards her, form themſelves in the ſame manner, and aſſume a ſoil abſolutely like that found in places far diſtant from her. There is only this difference, that thoſe laſt have already acquired ſome fertility from the ſweetneſs of the rain with which they have been waſhed for ſome ages; from the duſt mixed with the ſand, and from the putrefaction of ſome herbs, brooms, ferns, and other plants of a ſimilar nature, which have grown and died there. The walls of *Copenhagen* and *Cadiz*, a few years ago waſhed by the ſea, are now at a conſiderable diſtance from it, and this effect cannot be aſcribed to an augmentation of the ſand thrown to the feet of theſe walls. The *Lower Egypt* roſe out of the ſea, within theſe four thouſand years. In the days of *Herodotus*, were there not, near *Memphis*, rocks with rings of iron fixed in them for ſecuring the ſhipping? Notwithſtanding this, *Memphis* is at preſent twenty-five leagues from the ſea. The city of *Damiette*, which was ſituated at the mouth of the *Nile*, when St. *Lewis* beſieged and took it, is already nine or ten *Italian* miles diſtant from it.—Have not you told me, that at your arrival in *Egypt*

the caſtle of *Roſette*, now more than a mile from the ſea, was within a gun-ſhot of it? You know, we muſt grant that the fortreſs of *Damiette* was hard by the mouth of the *Nile* fifty years ago, in order to hinder the *Chriſtian* corſairs from entering that river.

These enlargements of earth near rivers, which like the *Nile*, the *Loire*, the *Rhone*, and the *Garonne*, carry a great deal of ſand to the ſea, have indeed ſomething very dubious, when conſidered as proofs of its diminution. Its waters, I know, may be put at a diſtance from theſe places by the matter conveyed thither by the rivers, without their ſurfaces being ſunk. But it is not ſo with the marks which you ſee of her diminution at the high mountains and rocks on which ſhe beats. Conſider in *Provence*, the ſteep rocks which ſerve as a mole to the ſea. Examine the coaſt of *Genes*, eſpecially from *Seſtri*, on the eaſt, to *Porto-venere*, you will there find, without any poſſibility of doubt or miſtake, the parts at which the ſea has arrived, but which ſhe does not now touch. You will there obſerve the ſame ſhells, which ſhe fixes to the place where ſhe beats; but whitened, as well as the rocks, by the air, in proportion as they roſe above the ſurface of the water. You will there obſerve the ſame depreſſions which the billows form in the tendereſt parts of the rocks againſt which they beat. The perſons who are ever ſo much prejudiced againſt the diminution of the ſea, muſt in theſe parts read their own condemnation.

The number of ages, and the degree of diminution of the ſea, are known upon theſe rocks.—We can, at leaſt, diſtinguiſh the period of a thouſand years, by the different impreſſions made from

the top to the foot of thoſe mountains, and upon the ſhells which the ſea has fixed to them. Have you ever conſidered that high rock which forms a cape in coming out from the harbour of *Crouta* to go to *Marſeilles*, that *Eagle's-Bill*, which is the name it receives, ſo much elevated above the ſurface of the ſea, that at no time the billows can riſe to half its height? The whole cruſt of this rock is an equal compoſition of ſhells, which the ſea has fixed to it at different times, from its top to the part where ſhe now is. Though the various injuries which you at preſent obſerve on the coaſt of *Genes*, are not ſo fully marked upon that rock, nor the impreſſion of the billows ſo ſenſible, becauſe it is compoſed of beds more equally hard than the mountains of *Liguria*, they are nevertheleſs ſufficiently obſervable.

What I have told you of your own coaſts, I can affirm to be true of all the others I have ſeen. There is no high mountain or rock, againſt which the ſea now beats, in which we do not find evident proofs of her diminution. A thouſand teſtimonies of this are found on the coaſts of *England* and *Ireland*. But it is not only on the mountains contiguous to the ſea that we find proofs of her diminution, ſince theſe are found alſo in places far diſtant from her, and even in the center of her continents. Very remarkable inſtances of this appear in the mountains between *Gap* and *Ciſteron* in *Dauphine*, where we diſcover the different degrees of the diminution of the ſea, by ſo many amphitheatres which ſhe has formed from the top to the bottom of theſe mountains. There are alſo very ſingular proofs of this in the mountains near *Antioch*, and along the coaſts of *Caramania* and *Syria*. We may ſay in general, that the proofs of the diminution of the ſea, are common to all the

mountains in the world, but especially to the steepest, and those whose hardness has best resisted the shocks of time. Is there any more convincing proof of this, than the mountains of congealed mud between which we pass in going into and coming out of *Toulon?* Whence proceed these collections of mud, and these narrow vallies, which divide them in certain places? How were these formed except in the sea by her waters and currents? Are not these rocks called *the Brothers*, as yet in the sea, within sight of that town, the effect of the same cause, though produced more slowly than the former? Does not the appearance of all the islands of the world, especially those that are rough and composed of petrified mud, such as those on the coast of *Provence*, particularly before *Marseilles*, inform you that they were but recently formed by the sea? The similarity of the grounds of these islands where she arrives no more, with the soils of these which she still washes; the same shells adhering in places the most distant from her, as those in parts the most contiguous, inform us that they are equally her work; that some of them are already come out of her bosom not to enter into it again, while others come out of it, and return into it when her waters are swelled by a violent tempest.

This diminution of the waters of the sea, has given rise to the opinion, that the stones grow upon her shores; and that the rocks are augmented in her bosom. It is this diminution of the sea which has furnished us with islands unknown to former ages, and made us lose so many others which were formerly known, but which we now search for in vain. It is this diminution which makes the ancient geographers pass for ignorant or inaccurate in the descriptions they have left us. One of my princi-

pal ſtudies, in my native country, has been to ſearch for ancient hydrographic charts. I have, in the moſt ancient, found ſeveral conſiderably large cities marked, which now ſubſiſt no more, and I perceived the want of a great many others, which are now found upon our coaſt. However, as moſt of theſe charts were made upon the diſputes which happened about frontiers, between contiguous nations and cities, and were depoſited by both parties in the public archives, to ſerve as common titles to the reſpective parties, it is not poſſible to doubt of the fidelity and exactneſs with which they have been compoſed. Hence we muſt neceſſarily conclude, that the faults obſerved in the charts are the effects of time, and of the changes which the diminution of the ſea has made on the grounds, by joining to the continent, iſlands which were ſeparated from it, or by making new iſlands appear which were not ſeen when theſe charts were made.

But, Sir, replied I here, is it not poſſible that the waters of the ſea may diminiſh on one coaſt, and be augmented on another; that they may appear to diminiſh, whereas they only change their place? That they may even ſubſide in their ſurface without a diminution, by ſinking into the earth, or falling into vaſt caverns? For it is difficult to believe, that theſe waters are either diſſipated or transformed into another element.

You give me a pleaſure, replyed our philoſopher, in affording me an opportunity of ſatisfying your doubts, and even of anſwering the ſtrongeſt objections, which have hitherto been made to my ſyſtem: But as this ſubject requires ſome extent, and as I muſt alſo refute the opinion of thoſe who are perſuaded that ſo many proofs of the diminution of the ſea, and of the fabrication of all our

grounds in her boſom, are the effects of chance, the ſports of nature, or purely natural productions, let me defer the pleaſure of entertaining you on this ſubject, till another day.

End of Third Discourse.

TELLIAMED;

OR, THE

WORLD EXPLAIN'D.

Third Day.

OTHER PROOFS OF THE DIMINUTION OF THE SEA—AN ESTIMATE OF THIS DIMINUTION, AND A REFUTATION OF THE CONTRARY SYSTEM.

NEXT day our philoſopher came to my apartments at his uſual hour, accompanied with other *Indians*, who before their departure from him aſked letters of recommendation from me, to ſome of our merchants eſtabliſhed at *Pondicherry* and *Surat*. I promiſed to grant their requeſt, and as ſoon as they retired, TELLIAMED reſumed his converſation in the following ſtrain.

IF the diminution of the ſea, was only confined to her ſubſiding a few cubits, we might perhaps, think, that by means of ſome earthquake, which

might have opened a road for her, to lower channels than those in which she formerly was, or to some deep cavern in the entrails of the globe, this quantity of water, though immense, with respect to its extent, might have followed such a road.— It would not even be absurd to suppose, that an extraordinary impulse may have carried the waters to a certain shore, which it may have drawn from the opposite one: But yesterday Sir, I made you observe, that the waters of the sea, have not only covered our highest mountains, but I also by numerous and evident proofs shewed you, that she had reared them in her bosom from their foot to their top; and that she consequently must have surmounted them considerably.

With *Lucretius's* leave, it is not the earth which has engendered the mountains, as he pretends*; it is the sea which has formed them in her bosom, and afterwards brought them forth by her diminution. In a word, if it was not so; if the waves in every part of our globe had not been, at least, equal to the tops of our highest mountains, how could we in the composition of the most elevated places find the same substances, which at present she produces on her shores? Without supposing such a preceding elevation, how can we account for this surprising phænomenon, that in the stones of *Europe*, and especially *France*, and other coun-

* In the fifth book, *Lucretius*, when explaining why the earth possesses the center of the universe, says, that at its origin, the rays of the sun happening to strike upon its surface when said bare, forced it to condense towards its centre, that then the vallies became low, and the mountains reared their tops in consequence of the rocks, whose bulk and parts could not equally subside.

Sedebant compi crescebant montibus altis
Asperitus; neque enim proterant subsidere saxa, &c.

tries at prefent far fuperior to the fea, there fhould be fhells, plants, and leaves of trees, which only grow in *China*, *Afia*, or *America*, or which are only conveyed to us from their feas: That in the compofition of the ftones of thefe other parts of the world, we find other fhells, plants, and leaves, whofe fpecies are only produced in *Europe*, or in her feas: That in a word, in all thefe parts of the world we obferve a great many other fpecies of fhells and leaves of trees abfolutely unknown, and which probably grow in places as yet undifcovered? How could thefe foreign and unknown fhells, plants, and leaves, pafs from one part of the globe to another? How could they be inferted in the ftones of the mountains in thefe places? How could they have been conveyed without the affiftance of the fea, and of her alternate currents from one of thefe parts to another? Confequently the waves muft have covered the places, in the ftones of which thefe bodies are found. If in *Europe* the fea covered the mountain of *Chaumont* in the foreft, and a part of the *Helvetian* hills, the *Alps* and *Pyrenean* mountains, in the fubftance of which we find plants which only grow in *Afia*, or *America*, if fhe covered certain mountains in *Armenia* and *China*, in the compofition of which we find fo many plants and leaves of trees peculiar to *Europe*, the whole globe certainly, then contained but fome few iflands, which were but little raifed above the furface of the fea.

Besides, in order to convince you farther, that thefe fabrications have no other caufe than the fea, confider, if you pleafe, the other marks which you find in the pofition of thefe eminences, the fea-flints, fo called, becaufe the fea has formed them; in the holes of the fea-worms, and in the various fea-fhells adhering to the adjacent rocks. Then

examine the arrangement of the plants or leaves in the ſtones in which they are found. You cannot doubt but they have been placed there horizontally to the globe, and ſo arranged that they appear to have been applied with the hand: You will indeed find ſome of them bruiſed or divided, no doubt by the impetuoſity of the torrents which carried them from the mountains ſuperior to the ſea, or by the violence of her waves; but you will find none of them folded, which is an infallible proof that they were kept in that extenſion by the waters in which they floated when they were at laſt precipitated to the bottom. Hence we muſt conclude, that our grounds have been formed in this manner, and gradually in the boſom of the ſea, of mud, ſand, and other ſubſtances which the waves contain, at all times, and which they carry from one part to another, where they arrange them ſucceſſively.

Now if the ſea has reared our mountains from foot to top, as it is impoſſible to doubt after the obſervations I have made; if theſe compoſitions could not be formed unleſs the waters ſurmounted their higheſt ſummit; if the ſea has ſince diminiſhed to its preſent ſurface, as the one ſuppoſes the other; that prodigious quantity of water, which was certainly greater than that which remains to be exhauſted cannot have paſſed from one part of the globe to another, ſince the ſea is equally diminiſhed in all parts of the world. It would therefore be unreaſonable to think, that the waters are augmented in height in ſome few places which have not yet been diſcovered, while they are diminiſhed in all other parts. Beſides, the ſurface of the ſea is not leſs convex than that of the earth. If that ſtate which is peculiar to the waters round a ſpherical body which turns upon its axis, ſuffers ſome

ſlight alteration in a tempeſt, which raiſes the billows in one part, and depreſſes them in another by ſome cubits, this tempeſt no ſooner ceaſes, than they return to their natural ſituation. Thus their elevation ought to be equal all over the globe, and their ſituation uniform.

The waters of the ſea could not be collected in the center of the globe, where there has never any vacuity been found below the ſurface of the waters, large enough to contain the quantity which is wanting from the ſummits of the mountains to their preſent level. This is eaſily demonſtrable. If our mountains had only been formed and reared upon an empty cruſt, which by opening, might have received the waters, and occaſioned their prodigious diminution; would not the waters which we find in the boſom of the earth after we have pierced this cruſt, be ſalt like thoſe of the ſea? However, the deeper wells are, the ſweeter waters they contain. Beſides, this vacuity when once filled, would prove no longer an occaſion of the diminution of the ſea, which is daily continued. It is therefore evident beyond diſpute, that this diminution of the ſea is real and actual, otherwiſe her ſurface, inſtead of ſubſiding, would be raiſed; for the rivers, torrents and rains, continually carrying a part of the grounds which they waſh, to her, and the winds perpetually conveying duſt into her, the bulk of all theſe ſubſtances muſt raiſe her waters proportionably; but on the contrary her ſurface is daily and viſibly diminiſhed. This is evident from the ſenſible marks of her diminution, which ſhe has imprinted on the ſteep rocks on which ſhe as yet beats.

I know, continued our philoſopher, you firmly believe that the elements are not tranſmutable. I

ſhall not confine myſelf to the proofs you have of the contrary among yourſelves, nor to the experiment made at *Paris* of the change of water included in a thick glaſs bottle hermetically ſealed for thirty years, into earth. Neither ſhall I affirm that the water of the ſea is changed into earth, ſince it is only by her diminution, that our mountains have appeared, and that the viſible part of the globe was uncovered. There would be neither mountains nor vallies, nor ſea nor water, if ſuch a transformation had been made. I do not affirm that any part of matter is loſt; and in this I agree with you and with *Lucretius**. The waters of the ſea, as I ſhall afterwards ſhew, ſubſiſt, notwithſtanding the diminution they have ſuffered, and which they ſtill daily ſuffer.

I do not believe that this diminution proceeds from the weakening of the effervescence, which was greater before than it is now. It would not be impoſſible that this ſhould happen in conſequence of a diminution of the heat of the ſun, or of the volcanos included in the bowels of the earth, which might have formerly inflated her waters to ſuch a degree, as to make them cover our higheſt mountains. Thus water heated in a veſſel, is augmented or diminiſhed, in proportion to the degree of heat which agitates it; but I am perſuaded that the diminution of the ſea proceeds from the waters taken

* It is in the fifteenth book, where this poet attempts to prove the unchangeable ſtate of matter, which is never more compact or extended, which is not ſuſceptible of augmentation or diminution; ſo that the motion of the principles of things, is always maintained in its immutability.

Nec ſtipata magis fluit unquam materiai
Copia, nec porro majoribus intervallis:
Nam neque adaugeſcit quidquam neque deperit inde.

from her. I ſhall explain the cauſes of this in another converſation, and hope that in this you will ſuffer me to confine myſelf to the proofs of this diminution.

The hiſtories we have left, are ſo recent, confuſed, and uncertain, in proportion to their diſtance of time from us, that it is ſurprizing we ſhould be ignorant of what preceded us by ſome thouſands of years. If the memory of it ſtill ſubſiſted, we ſhould in this tradition, or in our books, have inconteſtable proofs of the diminution of the ſea. There is no reaſon to doubt, that there have been maritime cities for an incredible time paſt, and that navigation has been in uſe for a great number of ages. The ſhip found in *Sweden* a hundred fathoms deep, in a place where labourers were working a mine, is a convincing proof of this.—If we juſtly know the poſition of the towns built on the ſea, and that of the moſt ancient ports, we ſhould have no occaſion for other proofs to deſtroy the almoſt general prepoſſeſſion againſt the diminution of the ſea; for there certainly were before, in places four or five hundred or a thouſand fathoms above her preſent ſurface, habitations and ports, frequented as ours are at preſent.

I do not pretend that cities and ports have been built on our higheſt mountains, being perſuaded that this globe was neither habitable, nor inhabited till many ages after the appearance of our firſt grounds; that navigation itſelf, and the uſe of that art in order to paſs from one iſland to another, were not known till long after the exiſtence of men; and that after a beginning, which was made by a plank, the progreſs of navigation has been ſo ſlow, that from that time till the building of the

ſhip found in *Sweden*, we may reckon an incredible number of years, and perhaps the half of the age of the earth. Nevertheleſs what in your hiſtories goes beyond three or four thouſand years, is not only obſcure, but even totally deſtitute of facts. I want no other proofs of this than your own bible, the hiſtory of the dynaſties of *Egypt*, and that of the *Chineſe* themſelves, though it goes to ages far before thoſe which you admit.

Have you ſometimes thrown your eye on the *Bibliotheca* of your *Herbelot?* It is a compilation of all that can be read in that of the ſon of *Callezanne*, and in ſeveral other *Arabian* authors: Of how many monarchies, wars, deſtructions of cities and nations, and generally viciſſitudes, do you not ſee the laſt traces, of which you do not find the ſmalleſt marks in the *European* authors. Theſe vaſt provinces of *Aſia* and *Arabia*, which have been the theatre of theſe events, only preſerve hiſtories of them, which are very imperfect, and ſo ſummary, that they leave more facts in obſcurity than they relate. Theſe provinces are reduced to ſo ſmall a number of inhabitants, that they are almoſt deſarts. Theſe inhabitants are already ignorant of the names of towns, on the prodigious ruins of which their ſmall cottages are built. Were there ever upon earth, two cities more large, populous, and famous, than *Epheſus* and *Alexandria?* However, there is not at preſent a ſingle inhabitant in the place where *Epheſus* formerly ſtood; hardly do we know the part were its temple, ſo much celebrated and frequented, was built. Of the lofty and vaſt *Alexandria*, which extended from the *Bigueirs* to the tower of the *Arabians*, forty *Italian* miles, there now remains no more than ſome pillars ſtanding or thrown down, and ſome ciſterns found in the middle of the mountains compoſed of their

own ruins. The preſent *Alexandria*, which only contains ſome refugees from *Barbary* and *Morea*, is not ſo much as ſituated within the bounds poſſeſſed by ancient *Alexandria*, ſince it is built upon the ſand which has filled up the ancient harbour of that city.

It is not therefore ſurpriſing, that we have loſt the memory of the poſition of the ancient maritime towns; and that we at preſent find ſome of them bearing their firſt names in places different from thoſe which they formerly poſſeſſed. They have had the ſame with *Alexandria*; they have changed their places, retaining their firſt denomination, and following the ſea, which is removed from their antient ſituation. If we are ignorant where a hundred famous cities were placed about two thouſand years ago, in Aſia and in Africa, is it ſurpriſing that we in vain ſearch for the poſition of cities, which perhaps exiſted fifteen thouſand years ago? Muſt they not have been ſubject to the deſertion of their inhabitants, in proportion as by the retreat of the ſea they became uſeleſs for the purpoſes of commerce?

Do you believe, Sir, that in a ſmall number of years, the people will have more certainty of the poſition of the preſent maritime towns, than we now have of theſe in ſo remote ages? Do you think that they will then be better inſtructed with reſpect to the preſent ſtate of our coaſts, continents, iſlands and harbours; or that from the change happening in the ſurface of the ſea, which muſt be ſucceeded by that of the land by which ſhe is bounded, they can judge more ſurely of her diminution? No, Sir, the fate of nations, cities, kingdoms, and the ſtate of the earth and ſea, which have preceded our days, will be that of our cities, geographical maps, obſervations and hiſto-

ries. The famous library of the *Fatimian Califs*, of which ſo many thouſand volumes were written in gold, was diſperſed by the ignorant *Saladin*, who did not know the ineſtimable worth of it.—Another as famous, has been formerly burnt at Alexandria, under the reign of one of the *Ptolemies*. Thoſe of the *Moſques* of *Cairo*, *Damaſcus*, and *Babylon*, partly enlarged with thoſe of the *Fatimian Califs*; and in which, among many other Arabian books, were the moſt beautiful works of the *Greek* and *Roman* authors tranſlated at the expence of Calif Aaron, by the learned men of his nation, whom he had ſent to *Conſtantinople* for that purpoſe, have been alſo diſperſed and loſt. Thoſe of the *Greek* emperors have not been more lucky. Yours will one day have the ſame deſtiny, notwithſtanding the favourable appearance of their duration, and the paſſion to collect ſuch numbers of them, with which the princes and grandees of *Europe* are at preſent animated. The deſcriptions they contain of all the coaſts which navigation has made known, of the iſlands we have diſcovered, of the ſoundings and ſhelves obſerved in the ſea, the particular ſtate of the principal capes and harbours of the world: their depth and extent, the maps which have been drawn of them with ſo much exactneſs, and which painting or ſculpture might have rendered capable in ſome thouſands of years, to prove the diminution of the ſea, and the increaſe of the iſlands and continents; all theſe things will not be tranſmitted to a very late poſterity.

No, it is not for want of hiſtorians, that we are ignorant of the actions of the heroes, who lived before the *Trojan* wars; it is becauſe the books compoſed before the *Iliad* and the *Odyſſey* are loſt, and with them the memory of the facts they contained; that of ſucceeding heroes ſhall not have a

better fate. The names of our Alexanders, our Cæsars and our Pompeys, shall about two thousand years hence, be buried in oblivion, with the works which speak of them; the name of *Louis* XIV. who has made so much noise in the world, those of a *Conde*, a *Turenne*, a *Vendome*, and a *Villars*, the principal instruments of the victories he obtained, shall also perish with the history of their master.—It will indeed be late, but they will at last perish; and the generation four or five thousand years after us, will no longer know these great men, just as we are already ignorant of those who were the ornaments of their age about as long ago.

It is not even present fame and the force of the most splendid actions, which determine the duration of names, and the remembrance of posterity; chance, and certain facts of great importance to mankind, have often a greater share in this than any other thing. The name of Americus Vespucius, will probably live longer than that of *Charles* V. who employed him so usefully for *Spain*, and for all *Europe*. I am even persuaded that the name of this emperor will be long preserved from oblivion, by that of this *Florentine*, but they will both perish at last. The *Egyptians*, who had in their hieroglyphical characters found an inalterable method of writing, by means of which they thought to transmit the observations they had made on the state of the Heavens and the earth to the latest posterity, have not, however, been able to preserve them from the shocks of time, nor transmit the knowledge of them to us. The meaning of their hieroglyphics is already lost, and the temples, as well as pillars on which they were engraved, demolished and destroyed.

To prevent, therefore, with respect to the subject of the diminution of the sea, the effects of oblivion and obscurity inseperable from a great

length of time, my grandfather found nothing more proper than to uſe the means, which in a few years furniſh certain proofs of this diminution. He could imagine nothing more proper for this deſign, than to eſtabliſh infallibly, and by durable monuments, the actual height of the waters of the ſea, and the epocha of this firſt obſervation.— He with grief ſaw, that the marks ſhe had imprinted in a hundred different manners, and for a great many ages, of her preceding elevation, could no longer give mankind a knowledge of the proportion of this diminution. The little care that has been hitherto taken, to fix the time in which the ſea has written each of theſe characters as intelligible as ineffaceable, in the natural books with which our mountains have preſented us, has rendered them uſeleſs to us. He judged, that the actual height, and the time in which this height was acknowledged, being once eſtabliſhed, theſe facts would not only infallibly convince poſterity of the diminution of the ſea which is not dubious, but alſo determine the preciſe progreſs of this diminution, which is a circumſtance of great importance to judge of the paſt and future ages of the globe.

My grandfather had about 6 or 7000 crowns a year, and about 30,000 which he had laid up.— He did not heſitate to employ the money for the purpoſes of travelling, notwithſtanding the love he bore to my father, who inſtead of being angry at his conduct, encouraged his expences of this kind. The lands which my grandfather poſſeſſed, were ſituated in places where wages and the nouriſhment of the labourers coſt but little. The quarries of ſtone and marble belonged to him, and were near his houſe. All theſe circumſtances facilitated the means of his executing his deſign in the following manner ;

He out of his quarries chofe the four forts of the hardeft ftone and marble, of which he caufed four octagon pillars to be erected. He then caufed a folid wall twenty feet thick and twenty high, to be erected round the little ifland or rock fituated before his houfe, which had laid a foundation for his obfervations, and after having fortified the fide of the wall oppofite to the fea, with large rock ftones heaped on each other, the interftices of which were filled with large flints, in order the better to defend the wall from the impetuofity of the billows, he ordered four wells ten feet deep each to be dug in the inclofure, which was about fix hundred paces in circumference.

He afterwards made in their bottoms a fmall horizontal canal, which communicated with the fea, in order to admit water to the wells every time it was neceffary. Thefe wells were paved and lined with the hardeft and beft cemented ftones.—He folidly erected the pillars in the middle of the wells, and after having for eighteen months introduced at different times the waters of the fea, at the greateft calms, it was eafy to know the prefent ftate of her furface, which in that interval he found nearly at the fame height. Then my grandfather ordered the pillars and the fides of the wells, to be divided into lines and inches, and took care that upon both, the year of this obfervation relatively the æras of all known nations fhould be cut in deep letters.

Not content with thefe precautions, he ordered a double dome to be erected round the four walls. The firft was built of bricks, and the outer one of cold ftone, and both were ten feet thick. Care had alfo been taken, fo to elevate the window which was the only entry to the firft dome, that

the waves of the ſea could not reach it in their greateſt agitation. My grandfather alſo made the outſides of theſe domes be fortified with large ſtones, as he has before done to the wall round the edges of the iſland, in order the better to defend them againſt the ſhock of the waves. In a word, the domes were covered with plates of lead ſeveral inches in thickneſs. Beſides the vaults compoſed of cold ſtone were built in ſuch a manner, that they could have reſiſted the rain and the injuries of the air, for a great number of ages, though the lead ſhould have been deſtroyed or conſumed by length of time. When his meaſurings of the ſea were repeated, which was twice a year, in the ſpring and autumn, he opened the canals, which paſſed between the bottoms of the wells and the ſea, and which were covered with a large plate of lead. They were cloſed up after the operation, and the water taken out of the wells, that nothing might be left to make an impreſſion upon the marbles, which were carefully cleaned.

My grandfather carried his care and induſtry ſtill farther. He ordered another well to be made in the continent, a ſmall way from his own houſe, and about three hundred paces diſtant from the ſea. But he made it much larger and deeper, and placed in it four columns of ſtone different from thoſe uſed for the others. Theſe columns were alſo divided into degrees, and had the actual height of the ſea engraved upon them, with the date of this obſervation, in four languages employed in marking the firſt pillars: The characters uſed for this purpoſe, were formed of ſtones of different colours inſerted in the others, in order to render this writing ineffaceable. From the ſea to this well, they dug a deep and winding canal through the rock which ſeparated them. This

canal ſerves to bring the water to the well, at the times of obſervation; except on this occaſion, it is always cloſed up at that extremity which terminates in the ſea.

THAT theſe wells might be preſerved, and the obſervations carried on without interruption, my grandfather round this laſt well built a firm and agreeable houſe, and affixed to it revenues in land capable of ſupporting ſix learned men to watch over it: After this favour he impoſed no other taſk upon them, than that of ſtudying all their lives what paſſed upon the earth with reſpect to the change produced in it by the diminution of the ſea, and thus to augment the proofs of this diminution, ſo great a number of which he had collected.—With this deſign two of them in company now and then travel into the various countries of the globe, to make a collection of the opinions or traditions which relate to this ſtudy. The collections which they make of theſe is to be wrote on parchment in four different languages like the inſcriptions of the wells, and depoſited every twenty-five years in ſix parts of the empire, ſo that my grandfather in that houſe depoſited the charts of the coaſt contiguous to his habitation, which he had prepared with the greateſt care and exactneſs.

I DO not pretend to know that my grandfather found the moſt juſt and certain method of determining the diminution of the ſea, and its progreſs, nor that the walls he built could not be in a more favourable poſition than where he has placed them. He has been obliged to conform himſelf to the ground with which his houſe is ſurrounded, and to the ſituation of the lands which he could ſet apart for the ſup-

port of these wells. I am even persuaded that islands are more proper than continents for these mensurations, especially such islands as are smallest, most distant from the main land, and against the shores of which the currents and the waves cannot stop, and raise themselves as they do against extensive coasts.

I know not a place more proper for this purpose, than that lake which I mentioned to you yesterday, situated on the coast of *Provence*, and which joins the isle of *Gein* to the continent of *Hieres*. We might even erect a graduated pillar in the middle of a bason, of hard stone, situated on a level with the real bottom of the lake, and divided internally by inches and lines. By making the first operation in a calm, we should have the precise measure of the real height of the waves; and bringing them afterwards back into this bason, it would be easy to know, both how much the bottom of the lake is raised by the slime brought to it by the sea, and how much the sea herself has been demolished, since the first observation.

The island of *Malta* has also appeared more proper to me for such a mensuration, than any other in the *Mediterranean*. Besides the advantage of its situation, which is pretty far from *Africa* and *Sicily*, there is reason to believe, that the present government and that species of republic, will last as long as the borders of the lake in which it is included, and shall, as at present, be divided among *Christian* and *Mahometan* princes.—This island has round it two large rocks to the east and the south, and a third to the west, between it and the isle of *Goze*, which will be of themselves, slow, but immoveable testimonies of the diminution of the sea. It will be sufficient, to evince this,

to consult an exact chart of its coasts and parts, adjacent, in which the shelves and depths are marked with precision. The city of *Malta* itself, its fortifications, and its batteries on a level with the water, whose disposition justly establishes the present state of the sea, and its height, may without any other assistance, teach posterity the diminution of the sea, if the plans of them are exactly preserved; and if in changing a fortification or battery, care is taken to mark upon new plains the changes which they have made, and the reasons which have induced them to make them. However, the wells dug on the rocks and little islands, as high as *Malta*, or on *Malta* itself, will greatly advance the testimonies of this diminution, without which this operation would be pretty expensive.

What hope might not a great master, who is generally a lover of his reputation and memory, conceive, of immortalizing his name, by succeeding in this enterprize? I spoke of that immortality with which we may flatter ourselves here below, and of a space, which though short, yet appears a kind of eternity, in the eyes of human weakness. If the names of *Europe* and *Africa* are still lasting, if that of *America* will last for a great number of ages, as we cannot doubt; why should not that name of him be immortal, who should teach inadvertent men prejudiced in favour of the contrary opinion, that this globe which they inhabit has been formed in the bosom of the sea, and afterwards shew, by the diminution of the waters, how long it is since the earth appeared above them, and how long it has been inhabited?

After the example of my grandfather, several governors of sea-port towns, and a great number of private persons who have habitations on the

ſea-ſhore, have eſtabliſhed ſimilar menſurations.—Some have placed in the ſea, on rocks inferior to her ſurface, pillars, on the top of which they have accurately marked the actual height of her waters. Others have raiſed rocks ſuperior to her ſurface, and equalled them with it, affixing at the ſame time plates of marble, which teſtify the year in which ſuch works were produced. Some have on ſteep rocks, againſt which ſhe ſtill beats, marked the preſent height of her waters, and above it written this obſervation and its date, after having at divers times obſerved the elevation of her waves. Others have dug wells in rocks ſcreened from the agitation of the ſea, and in certain grounds almoſt like thoſe which my grandfather made choice of. Experiments of a hundred different kinds have been made, and we have reaſon to hope, that ſome of theſe teſtimonies will ſubſiſt long enough, to triumph over the incredulity of men with reſpect to the diminution of the ſea, and to teach us the preciſe degree of this diminution.

I HAVE ſeen examples of this kind in ſome monumentsof antiquity, with which I hope you will not take it ill if I now entertain you. At cape *Carthage*, in the ruins of a fortreſs which might have been that of *Bothra*, built by the *Carthaginians*, I have ſeen three apertures in that part of the wall which was next to the ſea, which is at preſent twelve or fifteen feet high, and ſome fathoms in length, though its thickneſs is greatly diminiſhed. Theſe apertures, about four feet broad, whoſe depth could not be meaſured, becauſe their bottoms were filled up, but whoſe height is ſtill five or ſix feet, had been made to introduce the ſea into that fortreſs.

AN infallible proof that theſe apertures were deſtined for this purpoſe, is that their roofs as yet

covered with free-ſtones as well as their ſides, though the wall is only built of ſmall flints united by a cement as hard as iron, are raiſed higher towards the ſea, than at the part where they terminate on the ſide of the fortreſs. Now if theſe apertures had not been made to introduce the waters of the ſea, they would at leaſt have been equal; but if theſe apertures had been made to facilitate the diſcharge of the waters from the fortreſs, they would have been built quite differently, that is, higher within the fortreſs, and lower without it. We muſt believe from the form of theſe roofs or arches, that at the time when this fortreſs was built, the ſea was higher than the higheſt of theſe apertures; her ſurface, however, is now ſix feet inferior to them. She cannot even arrive at the foot of theſe apertures, from which ſhe is only two or three fathoms diſtant, except in a violent tempeſt, produced by an eaſterly or a north-eaſt wind. Hence I conclude, that the ſea was at leaſt five or ſix feet higher, than ſhe is at preſent, when this fortreſs was built; which, as we have good reaſon to believe, was more than two thouſand years ago. As far as I could judge, theſe apertures were deſtined for introducing the water of the ſea into a baſon contained in the middle of the fortreſs. Some gallies could formerly land here in an entry placed at the ſide of the fortreſs, and now filled up by its ruins; this baſon perhaps alſo ſerved for building ſhips, after which the water was let in through theſe apertures, in order to bring them out by others larger.

I found at *Alexandria*, at that point of the main land which leads to the rock on which the pharillon is built, ſeveral ſmall canals cut in the rock, terminating in the ſea, and communicating with the ruins of ſome buildings, obſervable on that point.

Theſe canals were certainly deſtined either to introduce the waters of the ſea into theſe edifices, or to convey water from them to the ſea. There is, however, a great probability, that they were rather made to admit the water of the ſea into baths, the forms of which are as yet diſtinguiſhed there, than to ſerve as diſcharges for other waters conveyed to theſe baths. I form this judgment, becauſe they rather decline from the ſea to the land, than from the land to the ſea, or at leaſt, there was no inclination towards the latter. The loweſt of theſe canals, which was yet pretty entire, and which might be two feet in height and fifteen or ſixteen inches broad, was at the time I ſaw it, covered with the ſea-water to the height of two or three fingers-breadth; but the wind which then agitated the waves raiſed them at leaſt the whole height of the water, which that canal contained. The ſuperior canals were abſolutely dry.

I ſaw others of the ſame kind at *St. John d'Acre*, formerly called the *Ptolemaide*; they were dug in that ſmooth and pretty large rock, which is before this fortreſs, and which being formerly covered with free-ſtone, ſerved as a plat-form and a mole to its harbour. Theſe canals were numerous, and almoſt as high and broad as thoſe of *Alexandria*; ſome of them were like the former, dry, and others of them filled with the ſea-water to the height of two or three inches. They were not only horizontal, and without a declivity to the ſea, but there were alſo one or two of them in which thoſe extremities, which were next the ſea, were not opened, but ſhut up by the ſtone of the rock itſelf. Hence it is obvious, that they were deſtined to receive the water of the ſea, and to convey it into the city; and that the ſea was conſequently ſuperior to theſe canals. In a word, without this ſhe could not

have entered into thoſe which were cloſed up, or her waters muſt have been admitted by a ſuperior aperture. When I ſaw theſe canals, the wind alſo agitated the ſea, and raiſed her waters at leaſt half a foot.

I CONFESS, that from the obſervation of theſe places, it is not poſſible to paſs a certain judgment of the actual degree of the diminution of the ſea. In a word, we know not preciſely either the time in which theſe canals have been dug at *Alexandria* and the *Ptolemaide*, theſe cities having ſucceſſively paſſed under the government of various nations, or in what year the fortreſs of *Carthage* was built, in which the apertures I have mentioned are found. We are alſo ignorant what the actual height of the ſea was, when the *Alexandrians* worked at that fortreſs, and at theſe canals; however, if we conſider the diminution obſerved in the wells made by my grandfather ſeventy-five years ago, which is at preſent about two inches, we may eſtimate that made in a century, to be about three inches, and in a thouſand years three feet. Now according to this eſtimation, the ſea having diminiſhed ſix feet in two thouſand years, which we may account from the building the fortreſs of *Bothra*, whoſe ruins we ſee at *Cape Carthage*, ſhe muſt have been ſuperior to the apertures obſerved there. Thus alſo the ſea, leſs than eight hundred years ago, was ſuperior to the canals, which I found in the point of ground joined to the pharillon of *Alexandria*, and upon the plat-form ſituated before the city of St. *Jean d'Acre*.

HOWEVER, by other teſtimonies, the diminution of the ſea ſeems to be quicker; for not to cite facts, but what you have an opportunity of examining, as I have already begun, there is between

Genes and the gulph of *Specia*, a rock called *Grimaldi*, from the name of a noble *Genoeſe*, who loſt a veſſel againſt that ſhelve, about ninety years ago. According to tradition, that rock did not then appear, though at preſent in a calm it is near two feet above the ſurface of the ſea. I have alſo been ſhewn upon the coaſts of *Languadoc*, between *Agde* and *Narbonne*, another rock pretty much raiſed above the ſea, though I was told that it only firſt appeared about ſixty or ſeventy years ago. In the motion which always agitates the waters of the ſea, even in a calm, it is difficult to mark a fixed point for her ſurface, which a preceding wind might have raiſed; beſides, that ſeveral rocks grow in the ſea by means of the ſand and ſhells which ſhe attaches to them in certain places, while ſhe undermines in others.

Now from the eſtimation I have made, of the diminution of the ſea, that is about a foot in three centuries, and three feet four inches in a thouſand years; you muſt conceive, Sir, how difficult it is for a man in the ordinary courſe of life, of fifty or ſixty years (for we muſt be twenty before reaſon is duly formed) to diſtinguiſh this inſenſible diminution amidſt the flux and reflux of the ſea, and the perpetual agitation of her waves, cauſed by the winds and the currents, which ſometimes raiſe them in one part while they diminiſh them in another. To theſe difficulties, add, that thoſe who have gone before us died ignorant of this diminution, for want of having thoroughly ſtudied the compoſition of the globe, and compared what paſſes daily on the ſhore of the ſea, and in her boſom, with what we ſee from her coaſts to the ſummits of our higheſt mountains. To theſe obſtacles, add, that our reaſon is reduced by the poſition of certain cities of very ancient names, which

we know to have been ſituated on the ſea-ſhore, in very diſtant ages, and which we find ſituated there ſtill.

People are not at the pains to obſerve, that theſe are the ancient names, but not the ancient ſituations of theſe cities; for the inhabitants of maritime places at firſt extend their habitations on the grounds which the ſea uncovers, as being moſt near to her, and conſequently moſt favourable for commerce, ſo that cities change their poſition by following the ſea, without changing their denomination, and without their change of place being perceived.

It is not therefore ſurpriſing that the diminution of the ſea, and the true origin of our globe, have been hitherto unknown to moſt of the human race, notwithſtanding all the circumſtances in nature, which point them out. However, now and then, and in all countries, there have been men, whoſe genius and application to natural things, have triumphed over the prejudices of birth and education. The opinion of the preceding ſuperiority of the waters of the ſea, to the lands at preſent viſible, and of their long continuance above theſe lands, has been that of ſeveral ancient as well as modern philoſophers. *Bernard Paliſſi*, a ſimple potter, who lived under *Henry* III. arrived at this piece of knowledge, by ſearching into the mountains in queſt of minerals, for the improvement of his art, at that time very imperfect. He dared to maintain the truth of his ſyſtem in public conferences held at *Paris*, where the moſt learned perſons of his time did him the honor to hear him, not diſdaining to pay the tribute which his poverty obliged him to exact of thoſe who attended his leſ-

ſons. He had poſted up publicly, that he would return their money to thoſe who ſhould prove the falſhood of any of the opinions he taught; but no body contradicted the ſenſible teſtimonies he had collected of his opinion, in ſeveral petrifications, which he had in his cabinet, and which he had taken out of the mountains and quarries of *France*; eſpecially of *Adrennes*, and thoſe on the banks of the *Meuſe* and the *Moſelle*. His works have been printed at *Paris*, and the facts which I have cited, are in them eſtabliſhed.

Telliamed was going to continue, when an unforeſeen accident, and ſuch as was pretty new for the country in which we were, made us think of ſomething elſe. It was ſuch a rain, as for ſixteen years had not fallen at *Cairo*, where it ſometimes does not rain once in four years. Though this rain was none of the moſt violent, yet it wet us ſo as to oblige us to quit the field. We parted under a promiſe to meet next day in the ſame place; and while our *Indian* ran to the city as faſt as he could, I who am not by nature favoured with the talent of running well, being wet to the ſkin, ſought for the beſt ſhelter I could find againſt this little deluge.

End of Third Discourse.

TELLIAMED;

OR, THE

WORLD EXPLAIN'D.

Fourth Day.

AN EXAMINATION OF THE DIFFERENT SYSTEMS, WITH RESPECT TO THE ORIGIN AND NATURE OF THE SEA-BODIES FOUND IN THE BOSOM OF OUR MOUNTAINS.

THE rains are never of long continuance in *Egypt*. In a few hours a ſerene ſky ſucceeded the ſtorm, which had parted us, and the next day was one of the fineſt that could be wiſhed for.

TELLIAMED was faithful to his appointment, and reſuming the converſation: 'I yeſterday mentioned to you, ſaid he, one of your modern philoſophers, to whom the ſyſtem I now explain to you, was not unknown, and who dared to maintain it in the capital of *France*. When I was at *Paris*, continued he, I ſaw an anonymous work compoſ-

ed by a modern philoſopher, and entitled *New Conjectures on the Globe of the Earth.* The author affirms, that in examining the internal parts of the globe, it is not poſſible to doubt but it is a compoſition of ſeveral beds of ſlime arranged upon each other, by the waters of the rivers, and conſiſting of the ſubſtances which they contain, at leaſt, to a ſeventeen hundredth part, and which theſe rivers carry off from the riſing grounds, in order to depoſit them on their banks or in the bottom of the ſea, to which they run; that the globe of the earth was originally formed of a flat cruſt compoſed of theſe depoſitions; that this cruſt being very thin, ſince the author only allows it to be two thouſand three hundred and fourſcore fathoms thick, includes a very ſubtile air, is ſupported by the weight of a double atmoſphere, which ſurrounds it, and preſſed on all parts both externally and internally; that this equilibrium having ceaſed at the time of the deluge, this cruſt was broken and ſhattered; that its wrecks floated in the ſea, as the clouds do in the air, or the ſhoals of ice in the water, were heaped on each other, and in certain parts ſo accumulated, as to form certain prominences or elevations; that our mountains proceeded from this; that by this ſubſtraction from the cruſt of the earth, of the pieces by which the mountains were then formed, there remained vacuities in this cruſt, perhaps, ſays he, two or three hundred leagues in diameter; that it is by means of theſe apertures, that the ſeas of both ſurfaces of this cruſt, at preſent communicate with each other; that theſe ſeas enter by the poles into the cavity of the globe, and that turning round this cavity in a ſpiral line, they come out between the tropics; that the entries of theſe waters from the external to the internal ſurface of the earth, and their departure from the internal to the external

ſurface, are the cauſes of the flux and reflux of the ſea, which are more ſenſible in one part than in another, according to the poſition and largeneſs of the paſſages, through which theſe ſeas enter or come out.

The author however does not believe that there is any thing animated, within the globe, except the fiſh that ſwim in the ſeas. Beſides, he is perſuaded, that there are rains in the ſea, and that there are in her ſeveral rivers, with which the internal ſurface of the globe is watered; and which, by their overflowing, ſpread ſlime upon the ground. He alſo admits of ſeveral volcanos in the cavity of the earth, which maintain a mild and gentle heat in it; and believes, that the rays of the ſun, paſſing through the waters, tranſmit their favourable influence thither. Upon theſe principles I ſee no reaſon why the author ſtopped, and did not favour this internal world with the production of every thing found in this, even of animals and men.—In a word, admitting his opinon, it is highly probable, that there are.

The proof he adduces for the thickneſs of the cruſt of the earth, is drawn from the degree of the elevation of the mercury in the barometer, in proportion as it is raiſed above the ſurface of the ſea, or depreſſed below it. By this experiment, it is evident, that mercury thrown into the ſea, in one of the parts where it pierces from one ſide of this cruſt to the other, would remain ſuſpended to the height of eleven hundred fourſcore and fifteen fathoms, which aſcertains the middle or the center of theſe two ſurfaces, without including in this thickneſs the elevation of the mountains, ſome of which are fifteen hundred fathoms high. He alſo

gives the reaſon why the ſeas on the internal and external ſurfaces of the globe, cannot abandon the channels they poſſeſs, in whatever poſition the globe may be when turning daily round its axis. This happens, ſaid he, on account of the extreme rapidity with which the earth is carried from the weſt to the eaſt. Thus the water in a glaſs fixed to a cord moved circularly with rapidity, does not quit the bottom of the glaſs, though its mouth is turned from the centre of the earth, or towards the horizon.

The different motions of the earth during its annual courſe round the ſun, were particularly explained in this treatiſe, with a peculiar brevity and accuracy. I am perſuaded, that if the author, whoſe erudition and diſcoveries deſerve uncommon eſteem, had been acquainted with what paſſes in the boſom of the ſea, or if he had more attended to the extraneous and marine bodies, which our grounds contain, he would eaſily have acknowledged, that they were the productions of the ſea; and that, in order to account for their origin, there was no neceſſity to have recourſe to a ſyſtem ſo unnatural as his.

No one can readily comprehend, how a globe full of air ſo large as our earth, was formed; conceive of what matter this vaſt bladder was compoſed; nor find out what blaſt extended it to its preſent bulk. We know that children form bubbles, by blowing through a pipe whoſe extremity is dipt in ſoapy water. But if the globe of the earth had at firſt been formed in this manner, of an unctuous matter, by means of an impetuous wind blowing within it, how could its weak ſides have been ſupported againſt the rays of the ſun,

which puſhed it with ſuch violence as to make it move millions of leagues in an hour's time?

But whatever the origin of this globe has been, how was it afterwards fortified by the bed of matter, which the author acknowledges to be added to its firſt cruſt, by the ſubſtances which the rivers carry along with them? The rivers could not exiſt, till there were grounds proper for collecting the rains and conveying them to the ſea. It was not even poſſible that there ſhould be rains, if there were not previouſly ſeas, lakes, or marſhes, whence the waters of the rains ſhould be exhaled. The rivers could not, on this occaſion, flow without a declivity. Thus before the origin of rivers, it muſt have been neceſſary that there ſhould be water upon the earth, to ſupply the rains. That there muſt have been elevations whence the waters ſhould flow to the ſea; and whence they ſhould borrow the matter of which our globe is formed. Now what were theſe firſt grounds in the globe, before theſe beds were compoſed? This is what is not eaſily comprehended, ſince abſtracting from the water, which deprives us of a knowledge of the inferior grounds, we diſcover none which is not formed by the ſubſtances carried off by the waters, or by beds of matter applied over each other.—Hence it is natural to conclude, that the ſubſtances carried off by the waters, muſt have had their beginning in the boſom of the waters themſelves, and before the exiſtence of the rivers.

Some, however, ſuppoſe with the author, that the cruſt of the globe of the earth, was flat, or almoſt flat, till the univerſal deluge, when it was broken. How in this caſe could the wrecks of this cruſt be heaped on each other in the ſea, into which they fell, and upon this cruſt form mountains fifteen hundred fathoms high? It is true,

that by means of a certain form which renders the exhalations light, they are capable of being ſuſtained for ſome time in the air, and carried over each other according to their greater or ſmaller elevation. It is alſo certain, that ice being lighter than water, floats upon it, that by this means the pieces of ice happening to ſtrike againſt each other, ſome of them are thruſt towards the bottom; whence their lightneſs bringing them towards the ſurface, they often remain engaged under others which they raiſe, while they themſelves are raiſed by others, ſo that the elevation of the ſuperior ſhoals grows in proportion to the number of thoſe collected below them. It is in this manner that the mountains of ice are formed. But can that which happens in the air and water, with reſpect to the clouds and ice which fluctuate in them, happen to the beds of ſtone which cannot float in the ſea, be engaged over each other in ſimilar motions, and form elevations? Our mountains could not therefore be raiſed in this manner, in the middle of the ſea, above the cruſt of the earth, as our author ſuppoſes.

In a word, let us with him ſuppoſe, that mercury thrown into the ſea cannot deſcend more than eleven hundred fourſcore and fifteen fathoms, which happens to be the center of the earth's cruſt; yet upon this principle, the wrecks of the cruſt of our globe, which on its rupture muſt have fallen ſide-ways into the ſea, could not have been ſunk below that depth, nor puſh towards the oppoſite ſide, other parts of this cruſt proper to form mountains. Thus we cannot conceive that they could have been formed, either by the elevations produced by the waters, in which the pieces of which they were compoſed would have floated, nor by the immerſion into the waters, of thoſe pieces

which would have puſhed and raiſed others in the oppoſite part. Neither can we conceive how the pieces of the cruſt of the earth, could have been plunged into the ſea. In parts where there was no earth, the pieces of earth could not poſſibly fall into the ſea; and where there was ſeas, was not this cruſt defective by all their depth?

We cannot even comprehend, that the water of the internal and external ſeas, which according to our author does not exceed the ſixth part of the ſolid cruſt of the globe, whoſe diameter is only two thouſand three hundred and fourſcore fathoms, ſhould in the time of the deluge be able to riſe upon the two ſurfaces of this cruſt, higher than fifteen hundred fathoms, in order to form mountains of that height. Far from riſing above their firſt level, the waters of the ſea, muſt have on all parts of this cruſt ſubſided, in order to fill the cavities which the wrecks employed in the compoſition of the mountains muſt have left. The author, in vain, ſuppoſes a violent agitation in the waters of the ſea, which has thus raiſed them on one ſide of the cruſt, and then on another, and by this means produced mountains fifteen hundred fathoms high. I believe he is the only perſon who can think ſo, or find the leaſt probability in the opinion.—No book, no tradition, has ever ſpoken of any thing ſimilar to this. Beſides, we ſee by your own writers, to whom the author appeals, that there were mountains before the deluge, that theſe mountains bore trees, and that the ark of *Noah* reſted on one of theſe eminences.

It alſo follows from the proof drawn from the mercury, included in a barometer, that though the waters of the two ſeas join, yet they cannot

paſs from one part of the globe to another, nor advance beyond that ſemidiameter of the cruſt where the mercury would ſtop. Beſides, if the globe of the earth was compoſed of a cruſt ſo thin as the author ſuppoſes it, and if it had opened in as many places as he imagines, ſhould not we on the ſurface of the ſea obſerve ſome of theſe apertures, which ſhould pierce from a ground on its external to another on its internal part, without their being filled with water, and without the view of the whole thickneſs of the globe being intercepted.—If there were none of theſe apertures, whoſe cavity the water had not filled, yet at leaſt ſome of them might be ſeen, on the edges of which we might diſcover the ſurface of this water. We muſt there obſerve ebullitions and gyrations of water, which the author aſſures us happen in theſe parts, and which he pretends are the cauſes of the flux and reflux of the ſea.

If it were alſo true, that a part of the ſuperior ſeas were plunged at the poles in the internal part of the earth, and that after having run through this internal part in a ſpiral line, it ſhould come out between the tropics, the dreadful and rapid currents thus maintained between one part of the globe and another, would again throw up what had been plunged internally towards the poles.—We ſhould, at leaſt in the meridional ſeas, know places which ſhould continually vomit mountains of water, and occaſion ſuch rapid currents as would render it impoſſible to approach them. But there is no place hitherto in the known ſeas where we obſerve any ſuch thing, and which is not acceſſible to ſhips. If, however, in this part, a portion of the ſuperior ſea was conveyed to the cavity of the globe, no ſhip durſt approach it by ſeveral leagues, without being carried off and ſwallowed

up. Can the boats which ſail upon your rivers of *Canada*, approach certain caſcades by half a league, without being carried off in their falls?

In a word, if the globe of the earth was hollow, and compoſed of a cruſt ſo thin as the author ſuppoſes it, we might conclude that all the other globes, whether, opaque or luminous, in the univerſe, were the ſame. Now if it was ſo, ſince thoſe of the ſun and ſtars are ſet on fire, their cruſt would have certainly been conſumed, and theſe globes deſtroyed. There would alſo be a poſſibility of ſounding every where, though we do not find the bottom at fifteen hundred fathoms deep.—Mount *Gemini* in *Switzerland*, though not the higheſt in the country, is near two thouſand fathoms high. Our ſeas then, and our mountains are of a greater depth and height than our author attributes to them.

But to convince you ſtill more, Sir, that our mountains, are not formed in the manner which this author ſuppoſes, permit me for a moment to make you conſider their external parts, of which the apparent confuſion has produced the error of this modern. It is true, there are grounds where the beds of matter, of which they are compoſed, are conſiderably diſtant from the horizontal direction of the globe; there are even ſome beds abſolutely perpendicular: But with reſpect to theſe, obſerve, I pray you, that ſuch collections of mud and ſand, as the currents of the ſea carry off from the depoſition of matters with which her waters are more or leſs impregnated, remain long ſoft, before they are petrified. It is therefore natural and ordinary, that ſome of the elevations happening to be undermined by thoſe currents which formed them, or by others, ſhould be cloven, and that

the undermined parts ſhould fall upon the neighbouring bottom. Thus the edges of rivers, undermined by the ſame matters which have formed the different beds of them, tumble into their channels. It is in this manner that certain elevations of ſand or mud, which were horizontal in the ſea, are become perpendicular.

But independently of theſe rare caſes, the diſpoſitions of the bottom of the ſea, are alone ſufficient to produce an almoſt perpendicular intermixture of theſe ſubſtances. The waters which run over it, continually apply to it the matters which they contain. Thus a bruſh dipt in water whitened with lime, and applied to a wall, leaves one layer of the lime, which a repetition augments, and renders thick enough to cover the blackneſs and deformity of the wall. It is from this, that in going from *Septeme* to *Aix*, we ſee beds of mud of conſiderable thickneſs, and almoſt horizontal, applied to each other for near a league. They have certainly been formed here by a current coming from the north-weſt and from the ſide of the ſea, which has formed them ſucceſſively after each other in ſeveral thouſand years. To explain this fact, it is not neceſſary to have recourſe to the wrecks of a beded cruſt, nor the heaping of its pieces upon each other. This application ſideways, would be repugnant to this, ſince according to the ſyſtem of the author, the wrecks of the cruſt ought to have been heaped up on each other.

It is alſo to be obſerved, that in a violent tempeſt, the waters of the ſea puſhed between the rocks, boil, as it were, and run a hundred different ways, ſometimes riſing againſt them, and afterwards falling from their ſummits, into their proper abyſſes. In like manner the waters puſhed by

rapid currents, aided by a violent wind, in the middle of certain heaps of mud which the waves have formed, elevate themſelves, ſubſide, and run back upon themſelves in an hundred ways, running according to the diſpoſition of this collection, building and deſtroying in their agitation, ſometimes in one direction, and ſometimes in another: The effect of this we at preſent obſerve in theſe high mountains of petrified mud near *Olioure*, in going from *Toloufe* to *Marſeilles*, and almoſt all along the cóaſt of *Provence*. Theſe mountains were long ago formed by the ſea, when ſhe covered them, and when the currents from the north-weſt, ſeconded by the wind, were thruſt thither with violence from the main ocean; ſo that being pent up among theſe heights and depreſſions obſervable there, they exerciſed their fury by a hundred motions oppoſite to each other. It was thus that in their agitation they formed theſe whimſical arrangements, where you ſo plainly diſcover the work of the ſea, if you give but the ſmalleſt attention, that you muſt neceſſarily grant, that theſe compoſitions can be aſcribed to no other cauſe.

We ſhould therefore be in the wrong, to be ſurpriſed at this confuſion, which is obſervable in the different beds of our mountains, and which to the author I have quoted, has been a reaſon to doubt, whether they were originally formed in the places where they are now ſituated. On the contrary, this confuſion well conſidered with reſpect to the preſent and paſt ſtate of the ſea, is a proof of their fabrication in theſe places of the depoſitions, which the waters have conveyed thither, and applied over each other with this diverſity at the times of their agitations. Can theſe beds, waved without any rupture obſervable in ſo many mountains, leave us the leaſt doubt, but they are

the natural work of the waſhing of the ſea? Could their matter already petrified, as it muſt have been, according to the author, on the cruſt of the earth at the time of the deluge, have been thus moulded and ready to yield to all directions.—We muſt therefore grant, that this could not happen, except when their matters were ſoft, and conſequently in the ſame poſition where theſe mountains were at preſent.

This truth is alſo confirmed by what I have ſaid of the prodigious number of extraneous or ſea-bodies which all the grounds of the world include, and which could only be inſerted at the time of their compoſition, and in the boſom of the ſea; beſides, the ſubſtances contained in rivers, could not be petrified but in the ſea, and by a certain ſalt only proper to her waters. Beſides, if on the ſurface of the globe, there are ſome petrifications formed of ſubſtances which the rivers ſpread on it, it is eaſy to diſtinguiſh them from thoſe formed in the ſea. The former have but little conſiſtence, and contain no ſea-bodies.

The general ſtate of the globe of the earth, which the author had not well conſidered, is alſo a certain proof of their origin; for the horizontal or nearly horizontal beds, of which moſt of them are compoſed from the top to bottom, extend almoſt always to thoſe which are contiguous to them, which ought not to happen, according to the ſyſtem of the author. The interruption which the vallies, and certain arms of the ſea, put between theſe mountains, fortifies this teſtimony of their formation in the parts where they are. In a word, notwithſtanding theſe interruptions, we may often find in contiguous mountains the ſame beds equally thick, and at equal heights? Can this

uniformity be explained on the ſyſtem which this author endeavoured to defend ? On the contrary, does it not demonſtrate the falſhood of it ? Thus the ſtate of the mountains is ſo far from giving him reaſon to think, that they were only compoſed of pieces collected and confuſedly arranged over each other in the deluge, that the order obſervable in them, and which the ſea herſelf, though ſhe ſeparates them in ſome places, has not been able to interrupt, ought to have convinced him, that they have been formed gradually, and in the ſame poſition, ſtill obſervable in all their parts, except a very few changes. I ſhall not reſume what I ſaid to you concerning the opinion of an univerſal deluge. The author ought not to have had recourſe to a fact of that nature, for an explication of the actual ſtate of our mountains.

Scilla, an *Italian* painter of the royal academy of painting eſtabliſhed at *Meſſina*, going one day from *Rigo* to *Muſorina* in *Calabria*, found in a place, at which he could arrive from the plain in two hours, a whole mountain of petrified ſhells, though he could find none in the neighbourhood. At this ſight he was ſo ſtruck with ſurpriſe, that he reſolved to read the ancient and modern authors, in order to know what they thought of theſe ſingularities. This ſtudy, and the knowledge he had acquired by his own meditations on the compoſition of our mountains, put him in a condition afterwards of compoſing a learned diſſertation, in form of a letter, againſt the opinion of *Crollius* and a doctor in his time, who pretended that the ſhells, whether broken or entire, found in the ſubſtance of ſtones, eſpecially the teeth of fiſh, ſo copious in thoſe of *Malta*, and which are called ſerpents eyes or tongues, according to their round or pointed figures, were only the effects of a ſport of na-

ture, and fortuitous configurations. In this diſſertation of *Scilla*, Sir, which is entitled, *Vain Speculation cured of Prejudices*, and which was printed at *Naples* with permiſſion, in 1670, you will find all that the ancient and modern naturaliſts have wrote on this ſubject. You will there find the opinion of the former, who were perſuaded that *Egypt*, *Africa*, and ſome other countries at preſent far from the ſea, were formerly her channels; you will there alſo read, that a very great number of modern philoſophers are of the ſame ſentiment.

Scilla makes it his particular buſineſs to prove, that the ſhells, bones, and teeth of fiſh, found in all the petrifications of the globe, are true ſea-bodies; that they are the ſpoils, the remains or parts of theſe bodies which were generated in the ſea, and formerly lived in it. He proceeds to the demonſtration of this truth in the following manner:

In the proofs of any truth, ſays he, the moſt certain and leaſt dubious, is that ariſing from eye-ſight; for there is a great difference between imagining that the apparent figure of a creſcent, which the panther bears upon his left ſhoulder, is a repreſentation imprinted on it by the new moon; and that the ſtreaks with which the muſical ſhell is figured, are true muſical notes; or judging that ſhells inſerted in a maſs of ſtone, which I know by my eyes are abſolutely ſimilar to thoſe of the ſea, are really ſhells, which come from it, and which by ſome accident, are inſerted and petrified in the ſubſtance of theſe ſtones. I have ſeen, continues he, in the cabinets of ſeveral princes and noblemen, ſtones, in which they pretended to ſhew me men, animals, and landſkips. But I have never found one of theſe perfect. I readily believe, that

the ſtone in which the ancients imagined they found the portrait of *Galba*, that which *Carneades* aſſerted to contain the image of *Paniſcus*, that which was ſaid to give a juſt repreſentation of mount *Parnaſſus*, and which *Pyrrhus* wore on his finger, bore ſome reſemblance to the figures which people imagined they obſerved in them. But I ſhall never believe that, without the aſſiſtance of art, they could perfectly repreſent either mount *Parnaſſus*, or the heads of *Galba* and *Paniſcus*.

This is not the caſe, continues he, with ſhells, and other ſea-bodies, which I find in the ſubſtance of ſeveral petrifications. I ſee theſe preciſely ſuch as thoſe of the ſea are. I find them ſo ſimilar in ſubſtance, figure, and every part, that I cannot doubt but they are the ſame. Of theſe I ſee not one, but ten thouſand kinds; and I ſee ten millions of each kind without the leaſt difference. Now, continues he, there would be no more reaſon to imagine, that theſe ſhells, of ſo many forms, ſo different, ſo numerous, whole, and broken, and of ſo ſingular and natural an agreement between their broken parts, are the effects of chance, and the ſports of nature; than to believe the mountains compoſed of broken pots obſervable at the gates of *Rome*, a fortuitous production of nature in that place, without any of theſe pieces of broken pots, having ever been a part of a real earthen pot.

It is far from being true, continues *Scilla*, that the great number of ſhells and teeth of fiſh, found in the ſubſtance of moſt mountains, is as *Crollius* and his adherents would have it, a reaſon to doubt of their being true ſea-bodies, or true parts of theſe bodies. On the contrary, their multitude

and diverſity fully atteſt their origin, ſince they are ſufficient to prove that theſe bodies are not the effects of chance; neither is the ſcarceneſs of ſome ſea-bodies in ſeas adjacent to mountains, where ſome of ſuch bodies are petrified, a reaſon to doubt of their being true ſea-bodies. In a word, at the ſeaſons when the ſouth-eaſt winds blow violently into the *Mideterranean*, its currents carry towards the coaſts of *Catania*, ſo great a quantity of ſhells, whoſe ſpecies are unknown in the neighbouring ſeas and coaſts, that whole buildings might be erected with them.

Martin Liſter, an *Engliſhman*, in the preface to his treatiſe on ſea-ſhells and thoſe of freſh-water, printed at *London* 1678, after *Scilla's* diſſertation, of which he probably knew nothing, alſo appears to doubt whether the ſhells, &c. found in great quantities in the ſtones of *England*, *Scotland*, and *Ireland*, were true ſea-bodies. His doubt is founded on this, that thoſe mountains contain various ſpecies unknown on the contiguous coaſts, and that the ſhells included in the ſtones, are of the ſame colour with the ſtones themſelves. When ſpeaking of the unknown ſpecies, he ſays, that the fiſh of them muſt have totally periſhed in nature; that they muſt have lived in ſeas ſo deep, or have ſo plunged themſelves into the mud, that they are never ſeen in the ſea.

You have been convinced, Sir, by the obſervations of my grandfather, on the preſent ſtate of the ſea, that there are ſhells ſo buried in the mud, that the ſpecies of them are unknown in the neighbouring coaſt. We find in the ſtones of *Europe*, twenty-four kinds of ſhells called *Corneamons*, of which we have hardly hitherto found two or three ſpecies not petrified. But this ſmall number is ſuf-

ficient to prove the reality of all the other ſpecies, which have not been diſcovered; the unknown ſpecies may have alſo failed and periſhed by the drying up of the waters in which they ſubſiſted.—There are few ſeas which have not particular ſhells as well as fiſh, and theſe ſeas happening to dry up, all the fiſh they nouriſh muſt fail with them. Theſe ſpecies may have alſo been no longer carried from the coaſts where they ſubſiſt at preſent, to the ſhores whither they were formerly conveyed, if between theſe two places there is a barrier formed by the diminution of the ſea. If for example, the ſhells conveyed to the coaſts of *Catania* come from the *Archipelago*, as we have reaſon to think, it is certain that the iſland of *Candia*, prolonging itſelf by the diminution of the *Mediterranean* as far as *Caramania* on the eaſt, and to the *Morea* on the weſt, theſe ſhells could be no longer conveyed to the ſhores of *Catania*, without the ſpecies having periſhed. The caſe may be the ſame with thoſe found in the mountains of *England*, and of which we find none in the ſeas with which that iſland is ſurrounded. Theſe ſhells may in former times have been carried thither by the currents of the ſea, from the various parts of the globe, which correſpond to thoſe coaſts, and by the diminution of the ſea, ceaſe to be conveyed thither afterwards. The mountains of *France* contain a thouſand evident teſtimonies of this interception of paſſage from one part of the globe to another; ſince they include plants and ſhells of a thouſand kinds, proper to other parts of the globe, and which neither grow nor are produced in your country, as I have obſerved to you.

With reſpect to the colour of the ſhells reſembling that of the ſtones, *Liſter* was in the wrong from this circumſtance to doubt of their being true

ſea-bodies: As theſe ſhells are compoſed of tranſparent pellicules applied to each other, it is natural, eſpecially after the death of the fiſh, that they ſhould imbibe the mud, ſlime, or ſand in which they are buried, and aſſume the colour of theſe. But they are alſo diſtinguiſhed by their ſurface, from the ſubſtance of the ſtones in which they are found; by a vitriolic matter, and by a ſmoothneſs which renders them eaſily ſeparable from the ſtone. If you ſuffer them to ſoak long in water, they loſe their petrification, and in ſome meaſure the colour they had contracted, which evidently proves that theſe ſhells, bones, and teeth of fiſh, are true ſea-bodies.

Scilla gives us an account of ſeveral groupes of very remarkable petrifications. In ſome we ſee ſeveral of theſe ſhells mixed with each other, and the teeth of fiſh interwoven. Thoſe of the upper jaw-bone are there diſtinguiſhed from thoſe of the inferior; and thoſe of the right are different from thoſe of the left. *Woodward*, an *Engliſh* author, has ſince compoſed a treatiſe to prove, that moſt of thoſe found in the ſtone of the iſland of *Malta*, are the teeth of a fiſh called the *Sea-Dog*. A ſingular groupe engraved in the diſſertation of *Scilla*, is that exhibiting a petrified jaw-bone, with three of the teeth ſtill fixed in it. From this the author concludes, that thoſe ſeparated from their jaw-bones could have no other origin. Some of theſe teeth are alſo found in theſe groupes with their roots, as well as without them. We there alſo ſee ſome of theſe teeth with their enamel, and others in which no part is wanting.

If theſe productions proceeded from the ſtone itſelf, ſays *Scilla*, the ſubſtance and the colouring of theſe teeth would be equal; but the enamel is

harder than the internal part, and of a different colour. If they were formed in the ſtone, this formation would be either by a gradual increaſe, or all at once. But in beginning to grow from a ſmall to a larger bulk, the tooth would meet with an obſtacle to its growth from the hardneſs of the ſtone. On the contrary, if we admit that they were there formed originally in all their bulk, we run counter to the rules of nature, who produces her works ſucceſſively.

In theſe groupes we alſo find ſome of the teeth conſiderably worn. Now, why ſhould they be ſo, if they had never been uſed? Theſe figures alſo exhibit various ſhells ſhattered, which could not have happened if they had been formed in the ſtone. Others are broken into ſeveral pieces, which are diſtinguiſhed by the agreement of one piece with another. We there ſee ſea hedge-hogs, with their prickles petrified as well as themſelves, and theſe, when re-united, would form the perfect hedge-hog, juſt as the pieces of a broken china ſaucer, when put together and cemented, compleat the ſaucer.

Besides, the pieces of the ſhells bear ſenſible marks of their rupture; for we evidently ſee that they have been broken. On the contrary, if theſe wrecks were the work of nature, the edges of them would be ſmooth as the reſt of the ſhell, and rounded like thoſe of a veſſel, prepared by a tradeſman. Such are the extremities of a truncated body formed in the natural matrix. Let nature produce an animal without a foot or arm, and the extremities at which this foot or arm are wanting, are not in the ſame ſtate as if theſe parts had been cut off with a knife, or ſeparated by another accident, ſince thay will be covered with ſkin, and ſmooth as the reſt of the body.

We alſo find in theſe groupes, repreſentations of matrixes of ſhells, ſome of which are in their infancy, while others are more advanced. We there ſee corals and ſkins of ſerpents in great number.—One of the moſt ſingular is that which repreſents the breaſt of a ſea-crab, holding in its claws a ſhell-fiſh already half broken. Is it poſſible, ſays the author, that this ſhould be the effects of pure chance, who ſo perfectly imitated what daily paſſes in the ſea, between the crabs and the ſhell-fiſh which are their prey? In a word, among theſe groupes there is a ſhell, in which the animal itſelf is petrified; an evident proof that it once lived there.

Scilla afterwards juſtly obſerves, that the point in diſpute is not to know, whether theſe numberleſs bodies found in petrifications are true ſea-bodies, which have exiſted in the ſea, or parts of theſe bodies; that the matter is to determine by what means, or event, they are either inſerted in the ſtones, or attached to their ſurfaces. Some, continues he, pretend, that this inſertion was made at the time of the deluge; others affirm, that theſe ſhells or fiſh being produced in ſome ſalt-water river or lake, have by ſome inundation, or even by ſubterraneous canals, been placed where we now find them. Towards the end of this diſſertation the author confeſſes, that he had been formerly of this laſt ſentiment: But ſays, that after he had conſidered the grounds where theſe ſea-bodies are found in greateſt plenty, after having reflected on the extent, the height, and thickneſs of the mountains which include them, the largeneſs of the fiſh inſerted in them, and the diſpoſitions of theſe mountains themſelves, he had changed his opinion; that, in a word, it was impoſſible to conceive, that any lakes or rivers ſhould be capable of furniſhing

theſe prodigious collections of petrifications in the places where they are now found. He confeſſes that he was ignorant how this tranſmigration could be brought about; and only adds, that he could not doubt, by the compoſition of ſeveral mountains, eſpecially thoſe little hills with which the city of *Meſſina* is ſurrounded, and which are all compoſed of beds and layers, but theſe repeated beds have been formed at different times, and are the work of as many inundations, in which the waters of the ſea have reached above all the mountains.

The ways of petrification, continues he, are different in nature; a certain volatile ſalt, a ſalt-water, an humidity alone long preſerved in the ſubſtance, are ſufficient for petrification; but it is requiſite that the quality of the matrix ſhould be proper for this petrification. It is from this, that ſhells inſerted in the ſubſtance of mountains, either petrify with them, or do not petrify at all, or receive a greater or ſmaller hardneſs in their petrification, according as the matter in which they are included is capable of receiving the one or the other. They are not petrified in the ſubſtance of the little hills with which *Meſſina* is ſurrounded, becauſe the ſubſtance of theſe hills is of a ſand which is not diſpoſed to petrification.

Langius, profeſſor of philoſophy and medicine in the city of *Luzern*, where he was born, has compoſed a treatiſe to refute the opinion, not only of *Scilla*, and his adverſaries *Crollius* and others, but alſo that which attributes to the deluge, the ſhells found either inſerted in our mountains, or affixed to their ſurfaces. With this view he has faithfully collected, in the firſt part of this work printed at *Venice* in 1708, all the reaſons which each party advanced. Then in the ſecond he lays

down thoſe on which he pretends to found his opinion, which is certainly very ſingular. He had from *Scilla's* reaſonings perceived the abſurdity of aſcribing theſe petrifications to a ſport of nature; he at the ſame time ſaw the impoſſibility that the waters of the deluge, which laſted ſo ſhort a time, ſhould be able to inſert into the internal parts of the mountains, at that time ſolid, and even raiſed to their greateſt height, ſhells as heavy as lead, and often of fifteen or twenty pounds weight.—He conceived at the ſame time, that he could not deny but theſe extraneous bodies included in our mountains, were either true ſea-bodies, or parts of them. What he therefore imagined to explain, and illuſtrate this doctrine, which is the moſt difficult in the whole compaſs of natural hiſtory, is what follows:

He pretends, that all the ſhells found in our mountains, whether whole or broken, have proceeded from the ſeed of the ſame ſea-bodies, entire or ſeparated; that by ſubterraneous caverns having been carried by the waters of the ſea to the foot of the moſt diſtant mountains, it has been elevated through their ſtones, often to their very ſummits, and rendered fruitful in the places where theſe bodies are, eſpecially at the tops of mountains, by the fecundity proper to the ſnow, with which they are generally covered; that theſe ſea-bodies are more or leſs perfect, more entire or divided, according as the ſeed of which they have been produced, has remained in it totally or been divided, and according as the diſpoſition of the ſtones is proper or improper to fertilize this ſeed; that thus, for example, the ſeed of an oyſter, or other ſea-ſhell fiſh, preſerved entire, and meeting in the place where it is rendered fruitful, an aliment proper for its growth, there produces two

ſhells ; that on the contrary, in other parts we only find one ſhell, becauſe the ſeed of which it was produced, was only proper for the generation of that half. *Langius* extends this diviſion of the ſeed to every part of the animal, ſuch as the head alone, a jaw-bone with or without teeth, a ſingle tooth, the bone of a fiſh's back, to one of its ſides or fins ; but alſo to parts of parts. Thus, a ſhell broken into twenty pieces, for example, the prickles of a ſea hedge-hog, which are ſo plentifully found in all ſtones, have, according to him, proceeded from ſo many portions of the ſeed proper for each of theſe parts.

Does not this ſentiment, Sir, appear admirable to you? It has for a principal foundation, ſays he, a kind of fleſh found at certain ſeaſons of the year, without bones or animal. This is what we call foſſile fleſh, which is certainly nothing elſe but a collection of the ſeed of inſects, or of inſects themſelves, beginning to unfold and diſplay themſelves ; which can have no relation to the production of the ſea-bodies, or of their parts in the ſubſtance of ſtones. Beſides, was it ever known, that there was a diviſion of the ſeed proper for the generation of a body, to form only a foot, an arm, or a leg, even in a matrix proper for that generation, and ſtill leſs a part of theſe parts, a finger, a bone or any other thing? Is not this ſentiment ſo abſurd, that the contrary ſeems to be already demonſtrated? We have ſeen bodies born without arms, legs, or even heads ; but did ever any perſon hear of arms or legs born without a body. Shells, whatever they be, are the ſkins, the houſe, or the defence of the animal. It forms it for itſelf, in proportion to its growth, and enlarges it daily by a glutinous matter which tranſ-

pires from its body. The ſkin of an animal grows with it, the bark with the tree, and the ſhell with the kernel. But we have never ſeen even in natural matrixes, the ſkin of an animal produced without the animal itſelf, the bark without the tree, and the kernel or ſkin of the fruit independently of the ſubſtance, of which they are the defence and covering. This would however, ſeem a thouſand times more natural, than the generation, without the fiſh, of the ſurface of certain ſea-bodies, or of ſome of the parts of this ſurface in the ſubſtance of ſtones, which is abſolutely foreign to them.

However, after a great many inductions drawn from certain facts, which have no relation to his opinion, *Langius* concludes his treatiſe in theſe terms. It is evident from all theſe facts, that the production of ſea-ſhells in our mountains, is ſo far from being impoſſible, that it is highly probable; I hope, on the contrary, you will conclude with me, that this is not only impoſſible, but alſo improbable to the laſt degree: There have as yet never been, nor never will be found, as the ignorant imagine, ſubterraneous canals which lead to the bottoms of the mountains the moſt diſtant from her. If there were any ſuch, we ſhould diſcover the courſes of them, which we have not as yet done. But though theſe chimerical canals ſhould exiſt, is it probable, that the ſeed of fiſh and ſea animals ſhould be filtrated through the ſubſtance of the mountains, often to their ſummits, or become fruitful after they have arrived thither?

The diviſion of ſeeds, and the generation by parts, which the author ſuppoſes, is a monſter in nature, and in the ſyſtem of generation. Beſides, in the ſubſtance of the ſtones, there are not only

the limbs and parts of ſea bodies, but alſo all ſorts of land animals, either whole or in part, as is proved by a learned *German*, in a particular treatiſe concerning the ſingular things found in the ſtones of his own country. Now, certainly the paſſage of the ſeed proper for the generation of land animals, could not happen from the earth which they inhabit, through the ſubſtance of the mountains, and much leſs become fruitful there. The point in diſpute is not only concerning the bodies of ſea and land animals, and their parts, which the mountains include, as I have obſerved to you, but alſo concerning all bodies extraneous to their ſubſtance, ſuch as ſhips, anchors, maſts, ſtones of a different colour or quality, pieces of agate, or any other ſubſtance, or pieces of gold and ſilver coin. Theſe bodies evidently could not have been produced in theſe ſtones by any ſeed, and are, no leſs than the bodies of ſea and land animals, irrefragable proofs that our mountains were formed in the boſom of the ſea.

The eaſt alſo produces ſeveral authors, who have treated of the marks which the ſea has left of her abode on different parts of the globe. But among all thoſe, he who has carried this branch of knowledge fartheſt, is *Omar el Aalem*, that is, *The learned Omar*, who taught philoſophy at *Samaracande*, about nine hundred years ago. He maintained, that there were in every part of the globe, and in its boſom, inconteſtable proofs, that it had riſen out of the ſea, by an inſenſible diminution of her waters, which ſtill continued to be carried on. He founded his opinion on this, that its cruſt was, according to him, kneaded with a cement compoſed of ſeveral ſhells of fiſh, and that this paſte, mixed with theſe different ſubſtances, penetrated ſo deep into its maſs, that in proportion to the pre-

ſent labour of the ſea, ſhe muſt have employed ſeveral hundreds of years in the compoſition of this cruſt, for the preſervation of which ſhe every day labours on her coaſts. He conducted his diſciples thither, from thence carried them to the mountains, and ſhewed them, from a compariſon of the ſimilarity of both places, that they were the ſame work, with this difference, that the one was more ancient than the other.

He ſupported his ſentiment by geographical maps, which he had the happineſs to recover, prepared more than two thouſand years before with the greateſt exactneſs, by the care of the kings of *Perſia* and the *Indies*. He ſhewed, by the former ſtate of the coaſts of theſe kingdoms, that moſt of them had already changed either meridian or longitude, by lengthing themſelves more or leſs towards the ſea, even to the extent of two degrees, according to the flat or more elevated diſpoſition of the ground. This was ſo true, that on the coaſts where the ſea on theſe antient charts was marked as ſhallow, and where there were iſlands, theſe were already joined to the continent; while others, before not ſeen, appeared at a conſiderable diſtance in the ſea. On the contrary, there was no lengthening of the ground on theſe coaſts, at the foot of which it was obſervable in theſe maps, that the ſea had been deeper, the diminution of her waters in theſe places, or the elevation of her bottom, not having been conſiderable enough to become ſenſible.

Omar to theſe maps, joined geographical treatiſes of the ſame time, in which were marked the names of the principal ſea towns, promontories and iſlands, their extent and figure, the depth of the ſea on their different coaſts where they could

be founded, and their diſtance from the line and firſt meridian. Theſe treatiſes ſerved to confirm the accuracy of the ancient maps which I have mentioned. At the ſame time *Omar*, by this means, proved the change which had happened in the figure of theſe coaſts, as well by the diminution of the ſea, (which that author, from various obſervations, calculated to be about three inches in a century) as by the ſand, ſlime, or other ſubſtances, which ſhe every day threw towards her ſhore, and which in places flat and proper to receive theſe ſubſtances, made the diminution appear more conſiderable and quick than it really was.

But, continued Telliamed, beſides the many proofs I have already given you of the diminution of the ſea, the brackiſh or ſalt-water found in the ſandy plains of *Africa* or *Egypt*, and in a great many other countries, when we dig wells in them, is a new proof of this truth. Are they not the effect of the ſalt which the ſea has mixed with theſe ſands when ſhe threw them into theſe places?—Why are the waters of theſe wells, and all others dug in places where it rarely or never rains, more ſalt than other wells? Are not the ſalt-wells found in ſeveral countries far from the ſea, the mines and quarries of ſalt diſcovered in certain places, whoſe hardneſs, or the ground which covers them, have not permitted the rain to penetrate and melt, and the ſalt lakes of hot countries where the rains are very rare, evident proofs that the waters of the ſea have formed, and for a long time covered the cruſt of the globe? Why is ſalt ſo ſcarce in *Ethiopia*, and all the countries under the two tropics, if not from this, that it there rains four months in the year, and that the continual fall of theſe freſh waters has waſhed away and diſſolved the ſalt of the grounds which they penetrate? But with

whatever rain countries are waſhed, and of whatever nature their ſubſtance is, whether rocks, ſand, earth, or ſtone, the ſalt which the ſea has mixed with their compoſitions, is always preſerved more or leſs. In a word, if we calcine ſtones or ſand; if we paſs metals, earth, wood, plants, animates or inanimate bodies, whatever the earth includes or produces, and in ſhort, freſh water, through an alembic, we find ſalt in each of them, and diſcover the veſtiges of the ſea, to which all things owe their origin.

In a word, Sir, independently of ſo many proofs, the ſurfaces of certain mountains are the ſtrongeſt and moſt ſenſible teſtimonies of the hand employed in forming them. Theſe teſtimonies, eſpecially in elevated places, ſo perfectly repreſent the effect which a torrent or rapid river produces on the ground inundated by it, that it is impoſſible not to diſcover in thoſe mountains the ſame configuration which the waters of the ſea have imprinted on the ſubſtances which ſhe conveys thither.—We muſt neceſſarily obſerve theſe equal arrangements, the juſtneſs of which no art is capable of imitating, nor of following the windings which the ſea has ſucceſſively formed on the inequality of grounds.

This is obſervable in going from *Marſeilles* to *Aix*, about three quarters of a league from *Septeme*, where, on the ſummit of a mountain, ſituated on the left, the mud conveyed from the north-weſt coaſt, or from *Martigues*, has in ſtopping formed the juſt arrangement of beds which terminate that eminence. At *Tripoli* in *Syria* we ſee a ſimilar arrangement, on the left, in looking towards mount *Libanus*, from a ſhip anchored in that road. Theſe diſtinguiſhed beds are arranged with ſo much juſt-

neſs, upon the various windings of the ground, that they are no thicker in one place than another, which is an evident proof that they have been produced by the diſpoſitions of different ſubſtances which the ſea has made in theſe places. It is viſible that theſe ſubſtances have been brought from *Tripoli*, by currents running from the ſouth, or from *Damaſcus*. From the ſame coaſts thoſe ſubſtances have been carried, which from the beds obſervable in the mountains of *Cape Bon*, and in all the reſt, which on the *African* coaſt border upon the *Mediterranean* ſea. On the contrary, the beds of the oppoſite mountains, ſuch as thoſe of *Genes*, the *Appenine*, thoſe of *Morea* and *Caramania*, have been formed of a matter carried from the currents flowing from the north-eaſt. The long rock on the right, near *Melun*, coming from *Fountainbleau* to *Paris*, has alſo been compoſed of beds, ſome tender and others hard, of the various ſubſtances which the waters of the ſea, coming from the coaſts of *Biſe* carry along with them. A croſs current which runs in the direction of the river *Seine*, and which has dug its channel, does not permit them to carry the ſubſtances they bring along with them farther.

It is in this manner, that the mountains which border on the *Mediterranean*, and numberleſs others compoſed like them of the matter of certain currents, have been terminated by others which bore upon them and oppoſed their prolongation. You cannot walk on the bulwarks of *Paris*, near the port of *St. Antony*, without obſerving the ſame work in the mountains adjacent to *Montfacon*, nor conſider the buttreſs of that place, without diſcovering this arrangement of beds, and different ſubſtances, the places whence they have been brought, and the direction of the currents which have ter-

minated them. The flux and reflux of the ſea, by which theſe currents were aſſiſted, paſſed then on the ground where *Paris* is ſituated, entering there with rapidity from the direction of the *Seine*, and extending over the plains of *St. Germain*, and *St. Denis*, left on the right the mountain of *Montfacon*, and on the left that of *St. Genevieve*, which is waſhed away, while at the mouth of the gulph it formed the ſmall mountain of *Montmartre*.— Thus not only the aſpect of all ſteep mountains acquaints us with the manner of their compoſition by beds, but alſo the termination of theſe mountains teaches us the place whence the matter which compoſes them has come. The leaſt inſpection then into the fabrication of our mountains, affords us evident teſtimonies of their origin.

The conformation of the dry part of the globe, and of that part which the ſea ſtill conceals from us, together with the external and internal parts of our mountains, are irrefragable proofs of the truth of my ſyſtem. The poſition and aſpect of theſe mountains, the ſubſtances of which they are compoſed, the ſtones of all kinds, the marbles whether uniform or variegated in colour, which are only congelations, the beds of flint included between two others of ſand, the reſemblances of theſe ſubſtances to thoſe which the ſea daily employs in her bottom and on her ſhores, the beds which they compoſe, and their arrangement ; the terreſtrial and extraneous bodies, wood, iron, plants, bones of men and other animals, ſtones of a different ſubſtance inſerted in our mountains ; the numberleſs ſhells known and unknown, and adhering to their ſurfaces, and contained in their internal parts ; the whole beds of them which we find in ſome parts of the earth, ſo many other ſea-bodies found in their boſom, ſo many ſhells, plants and

leaves proper to certain regions, diſcovered in the grounds of other countries ſituated in diſtant parts of the globe, the always horizontal manner in which ſuch bodies are arranged in the grounds, the old iſlands united to the continent, and the new ones which have appeared, the harbours filled up, while others are produced, the towns forſaken by the ſea, the new grounds with which our continents are viſibly augmented, the ſalt lakes and wells, the brackiſh waters, the quarries of pure ſalt in places far diſtant from the ſea, a thouſand effects proper to her found in countries far diſtant from her, the aſpect of the ground near her, ſo like to that with which ſhe preſents us, that it is almoſt impoſſible to diſtinguiſh them; in a word, every thing in nature informs us, that our grounds are the work of the ſea, and that they have only appeared by the diminution of her waters.

THIS, Sir, continued TELLIAMED, is no leſs certain, than the proportion and degree of this diminution. There has been a time when the firſt mountains of the globe have begun to be covered with trees and graſs, another when animals appeared upon them, and another when they began to be inhabited by men. If theſe periods cannot juſtly be determined, we may, at leaſt, gueſs pretty nearly at them, by laying it down as a foundation, that ſince the appearance of the firſt grounds, the diminution of the ſea has always preſerved a degree of equality proportioned to the extent of their ſurface; ſo that being leſſened from age to age, and becoming daily more impregnated with a large number of extraneous bodies, her diminution is accelerated proportionally every day.

THESE principles being granted, our buſineſs is to find out the degree of the actual diminution of

the ſea, and of the augmentation of the earth, which may be eſtabliſhed by the menſuration of the ſea, for two or three hundred years at moſt.—After this it will be eaſy to know the number of ages ſince the firſt of our mountains appeared above the ſea, by taking the elevation of the higheſt mountain, above the actual ſurface of the ſea at this time. This elevation being known, we can by the preſent progreſs of the diminution of the ſea, during an age, determine that of preceding ages; conſequently we can aſcertain the time ſhe has employed in this diminution, ſince the appearance of the higheſt mountains, conſidering at the ſame time, that their ſummits have loſt ſome of their primitive height; and certainly this loſs muſt be very conſiderable, ſince for ſo many ages theſe ſummits have been expoſed to the attacks of winds, rains, ſnows, heat and cold, which muſt have mouldered them away and made them lower.

We may alſo from a knowledge of the progreſs of the diminution of the ſea, from one age to another, nearly judge of the time ſince this globe was inhabited by men. It will be ſufficient for this, to examine the higheſt parts of the mountains, in the petrification of which we find earthen ware, which is the work of man. Then by meaſuring the elevation of theſe places above the preſent ſurface of the ſea, we can know the time when theſe waters were employed in this petrification, which will be a proof that mankind then exiſted upon the earth. For example, if we found pieces of brick or earthen ware in quarries twelve hundred feet above the ſea, ſuppoſing the common degree of her diminution to be three inches in a century, we ſhall find that the earth has been inhabited by men, near five thouſand years, and perhaps more. I ſay more, continued our philoſopher, becauſe it

is certain, that men did not from their origin invent the art of making earthen ware for their commodity, and becauſe we cannot be ſure that the higheſt part, where this earthen ware is, is the moſt elevated of any others, which may contain it. But we muſt at leaſt know the time ſince this petrification was formed; and it will be evident that mankind exiſted then.

We ſhall go farther, Sir, and conſider the uſeful object of this ſtudy, adding to this knowledge, that of the preſent extent and depth of the ſea, which is not impoſſible to be found; the ſurface of the globe being at preſent nearly all known, we may judge of the progreſs of the future diminution of the ſea, relatively to the waters which remain in it, and the depth which their ſurface conceals from us. Now from this progreſs it will be eaſy to conclude, how many ages will be neceſſary to the draining the preſent ſeas, and nearly to determine when the earth will ceaſe to be habitable, man and other animals periſhing with the things which moiſture and the heat of the ſun produced, and which ſerved as nouriſhment for them.

We ſhall arrive at this knowledge of what is paſt, and what is to come, by ſuppoſing that the ſtate of the heavens, with reſpect to the globe of the earth, has been always the ſame ſince the ſummits of our mountains began to riſe above the ſea, and that this ſtate will not be changed till the entire diſſolution of things. But what, Sir, will ſurpriſe you, is, that notwithſtanding the generally received opinion, that the ſtate of the world, ſuch as it now appears, has always been the ſame, and will be ſo till its total annihilation, this ſyſtem is not ſo certain, but that the oppoſite ſentiment is ſupport-

ed by well-founded facts and traditions. This is what I ſhall entertain you with next time I ſee you? and in order to prepare you the more eaſily to comprehend what I ſhall ſay on this ſubject, I beg you would once more read the evenings of the plurality of worlds, which I ſee among your books. The ingenious author has there ſo ſenſibly eſtabliſhed the ſtate of the other opaque globes of our ſyſtem, which are in nothing different from that which we inhabit, that you will not be obliged to hear from my mouth with leſs pleaſure than you will have in reading that agreeable work, things ſo ſingular, that they are above our views and imaginations.

End of Fourth Discourse.

TELLIAMED;

OR, THE

WORLD EXPLAIN'D.

Fifth Day.

CAUSES OF THE DIMINUTION OF THE SEA, AND CONSEQUENCES OF THIS SYSTEM, WITH RESPECT TO THE PAST, PRESENT, AND FUTURE STATE OF THE UNIVERSE.

I DID not ſee TELLIAMED for two days, becauſe he was preparing for his departure. I was ſo enamoured with his ſyſtem, that I waited with impatience till he ſhould communicate to me the ſingular things he had promiſed to explain. My reading the plurality of worlds had ſtrongly excited my deſire of hearing our philoſopher reaſon on that ſubject. I before knew the turn of his thought, and expected ſomething very ſurpriſing from him. I was not diſappointed; for in two days he returned to me, and made ſome excuſes for his abſence. But I interrupted him, becauſe

I was unwilling to loſe in compliments, a portion of time which I thought might be employed to better purpoſe. I teſtified my joy in ſeeing him again, and begged of him to proceed: He granted my requeſt, and ſpoke in the following ſtrain.

The diminution of the ſea from the ſummits of our higheſt mountains, to her preſent ſurface, ſuppoſes, Sir, as you very well know, a preceding ſtate of this globe, in which it was totally covered with water. It is our preſent buſineſs to enquire into the reaſon of theſe different ſtates, or how it came about, that the ſea, ſhould ſurmount all the matter of which our grounds are compoſed, and what is become of her waters.

Gadrois, one of your authors, in 1675, printed a treatiſe, in which, according to the new opinion of one of our greateſt philoſophers, he pretended to account for the formation of all the opaque and luminous bodies which compoſe this univerſe. He ſuppoſed them, according to your principles, a creation in time, of matter and motion, by means of which, and the different figures of this created matter, there was, ſaid he, a ſeparation made, of which the arrangement we ſee, the planets, the ſtars, the ſun, the light, and theſe regular motions which we behold, are the effects.

It would be eaſy for me to prove, that this ſyſtem of the beginning of matter and motion in time, is repugnant to reaſon, and cannot be ſupported by your own philoſophers. I could from the authorities of *Grotius* and *Vatablius*, two of your moſt celebrated interpreters of ſcripture, ſhew that theſe words, *In the beginning God created the Heavens and the Earth*, is a very improper verſion of the *Hebrew*; that the words uſed in that language

ſignify only *made or formed the Heavens and the Earth*, and that the juſt tranſlation of the *Hebrew* phraſe is, *When God made the Heaven and the Earth, Matter was without Form*; that, in a word, the Septuagint has rendered the *Hebrew* word *Barach* by a *Greek* one, which ſignifies no more than *made* or *formed*; that according to the remark of the learned *Burnet* in his theory of the earth, the word *create* is a new term, invented a few ages ago, to expreſs a new idea, and has no word correſponding to it either in the *Hebrew*, *Greek*, or *Latin*; and that thus your bible ſuppoſes the pre-exiſtence of matter, which God put in motion from all eternity, and of which he formed the heavens and the earth.

But if I conſulted reaſon, which is the only guide of a philoſopher, I ſhould tell you, that I cannot comprehend how matter and motion had a beginning, and muſt conſequently believe them to be eternal; that I have known able philoſophers among you, who pretended to adduce invincible proofs that matter could not be annihilated; and that if this is granted, we may thence conclude, that it has exiſted in every period of time, and is not leſs eternal, *a parte ante*, than *a parte poſt*, the one being a natural conſequence of the other.

In a word, to uſe the thought of one of your authors*, can they who know nature, and have a reaſonable idea of God, comprehend that matter, and things created, ſhould be only ſix thouſand years old; that God had deferred the production of his works during the preceeding part of eternity, and that he only lately exerted his creative power? Did he ſo, becauſe he could not, or be-

* *Perſian* letters, let. 103.

cauſe he would not exert it? If he could not do it at one time, he could not do it at another; ſo that it muſt have been becauſe he did not chuſe it. But as there is no ſucceſſion in God, if we admit that he once willed a thing, he muſt have willed it from eternity.

You will perhaps object to me, continued Telliamed, theſe trivial difficulties ſo often refuted, and always advanced with ſo little ſucceſs: If the world was eternal, why, during this eternity, ſhould not the mountains become flat? Why ſhould not arts and ſciences have been ſooner invented? Would printing, the mariner's compaſs, and gun-powder, ſo beautiful and uſeful inventions, have remained unknown to mankind for an infinite number of ages; Theſe objections, however ſpecious to ſuperficial and prepoſſeſſed minds, which only touch on the ſurface of things, vaniſh like ſmoke, before the clear and reſplendent light of reaſon. I ſhall not mention the changes which, ſuppoſing the eternity of the world, muſt have happened to the globe of the earth. It has ſuffered very remarkable ones, even within theſe four thouſand years, according to the accounts of all hiſtorians. Very conſiderable changes have happened to the reſt of the univerſe, and I ſhall by and by ſhew, that the globe we inhabit, as well as all the others in the vaſt extent of matter, is really ſubject to ſuch viciſſitudes; that ſuppoſing it to be eternal, it muſt at preſent appear to us in no other ſtate than that in which we now ſee it.

To the objection drawn from arts and ſciences, independently of my ſyſtem, which removes the greateſt force of the difficulty, we anſwer, that the human mind invents but by little and little, and ſo ſlowly, that in order to produce the ſmalleſt novel-

ty, it requires ſeveral ages * ; that we have loſt an infinite number of curious ſecrets, of which hiſtory has only preſerved the remembrance to us ; and that the diſcoveries of whatever kind made two centuries ago, will certainly one day be buried in oblivion ; the ancients have perhaps had a greater number which have not come to our knowledge ; that the invention of arts and ſciences, is not ſo recent as is pretended, as may be ſhewn by tracing back to the moſt diſtant ages ; that the *Romans*, who, modeſtly ſpeaking, were not inferior to us in uſeful and agreeable arts, owed almoſt all their knowledge to the *Greeks* ; that the *Greeks* borrowed from the *Egyptians* all that ſkill which has rendered them ſo famous ; that numberleſs ages ago, theſe laſt had acquired perfection in all the arts and ſciences ; ſince according to your own hiſtorians, they were remarkable for their improvement, when the *Jewiſh* nation was but in its infancy ; that the *Chaldeans* did not yield to them in this reſpect ; and that the *Chineſe* diſpute their title with both.

We may add, that of theſe modern inventions ſo much extolled, ſuch as teleſcopes, the mariner's compaſs, gun-powder, and printing, the two laſt, eſpecially, are not new, but to ſome people ; that they are, on the contrary, very old in *China*, which renders it very probable that they have alſo been known to other nations ; and that if they are loſt there, it is, perhaps, becauſe they have been

* With what prodigous ſlowneſs do men arrive at any thing reaſonable, how ſimple ſoever in itſelf? To preſerve the memory of facts, ſuch as they have happened, is, one would think no hard taſk ; however, ſeveral ages muſt paſs before we are capable of doing it ; and even then the facts we remember will appear to be but viſions or dreams.

Fontenel'e de'l origin de fables.

there neglected and despised, as the *Turks* have for a long time neglected and despised printing; that what we read of the voyages and maritime commerce of the *Phenicians*, *Carthagenians*, and some other nations, leaves it dubious, whether they had not the means of supplying the mariner's compass by some other secret unknown to us; that after all, these new discoveries have much more splendour than solidity, and that perhaps, they are not at present new, but because they are useless*; that in a word we do not now live longer, nor are more sound and robust, on account of our improvement in anatomy; that by the discovery of some stars, astronomy is not more perfect; that for want of knowing what we call new inventions, the *Romans* and *Grecks*, the *Egyptians* and *Chaldeans*, were neither less great and powerful, less rich, knowing and learned; that since, for so many ages, men have lived in the ignorance of these discoveries, it is not impossible but they may still be older, and that the world having been without them for six or seven thousand years, may be as well without them for sixty or seventy thousand.

But, continued Telliamed, not to enter upon a question, which you look upon to be necessarily connected with your religion, though in my own opinion, the former is quite indifferent to the latter, let us be here content not to fix a beginning to that which perhaps never had one. Let us not measure the past duration of the world, by

* There is a certain degree of useful branches of knowledge, which mankind acquired very early, to which they have not added very much, and which they will not exceed a great deal: As for other things which are not so necessary, they are discovered gradually, and in a long series of years. *Dial. des Morts d' Lafitau & Herv.*

that of our own years. Let us carefully conſider what preſents itſelf to our view in this univerſe, this immenſity of the firmanent, where we ſee ſo many other ſtars like our own ſparkling, and which without doubt, only appear ſo little on account of their diſtance. Let us imagine to ourſelves what is rendered highly probable ſince the invention of teleſcopes, that if we were placed at the higheſt point of this diſtance from our earth, which we can reach with them, we ſhould perhaps diſcover as many worlds above us, which would be no leſs diſtant from our view. Let us enquire after the manner in which this univerſal ſyſtem perpetuates itſelf nearly in the order in which we have found it. A knowledge of this will teach us how it has been formed, better than all our conjectures.

Our eyes, reaſon, experience, and the diſcoveries made in the heavens, ſince the invention of teleſcopes, have taught us that the ſun, by his heat and the motion peculiar to him, makes our earth, and the other planets within the ſphere of his fire, or within his vortex, as your philoſophers expreſs it, turn round him. We alſo know, that carrying them round him in this vortex of matter which ſurrounds them, and in a ſhorter or longer time, according to their greater proximity to, or diſtance from his diſk, he alſo makes them turn round themſelves, ſome more quickly, and others more ſlowly, according to their peculiar diſpoſitions. We muſt however except the ſatellites of *Jupiter*, and thoſe of *Saturn*, which indeed turn round the ſun, but are in their circuit carried along by their proper planets, from the motion of which round that ſtar, they borrow and receive their own.—Thus the moon borrows and receives hers from our earth, without turning round her own axis; ſo that ſhe never preſents us but with one half of her

ſurface, which is always the ſame. This no doubt holds equally true with reſpect to the ſatellites of *Jupiter* and *Saturn*.

To theſe general obſervations, let us add, that the ſun, or at leaſt the force of his heat, is from time to time ſubject to alterations. The *Roman* hiſtory, for example, informs us, that after the death of *Julius Cæſar*, the heat was for two years ſo weak, that the things neceſſary for the ſupport of life, could hardly arrive at maturity. Beſides, we at certain intervals obſerve in his diſk, ſpots, which approach and recede from each other, and are afterwards diſſipated. With teleſcopes we alſo perceive in him, a prodigious number of volcanos or mouths, which diſcharge flames, and whoſe borders being obſcure render them more ſenſible.

We alſo know that his rays do not produce the ſame effect, when they fall upon the waters, as when they ſtrike upon the ſolid parts of the globe, and that even their vibrations are not always equal. Hence it happens that our days are a little longer than they were formerly, and that in the reign of *Julius Cæſar* they were alſo longer than they had been ſome time before. We muſt certainly believe ſo, ſince it was then neceſſary to retrench a certain number of them, to bring the equinoxes to the true point whence they had receded, and compoſe a new calendar, which took its name from that dictator. But under the pontificate of pope *Gregory* IX. who made a ſimilar reformation, was it not neceſſary to retrench eleven days of the year, to bring the ſeaſons back to the natural point whence they had varied? In a word, after the ſmall number of years elapſed, ſince this ſecond reformation, is there not at preſent a neceſſity for retrenching two other days, which can only

proceed from an alteration of the force in the heat of the ſun, or from a change in the ſurface of our globe by the diminution of the ſea?

In a word, I pray you with me to make one eſſential obſervation, ſince it leads us to a knowledge of the reaſons of this variation in nature, whether with reſpect to the ſeaſons produced by the annual courſe of the earth round the ſun, or with reſpect to the length of the days, and the greater number of circles it ſeems to deſcribe in the northern than in the ſouthern part, a phenomenon which philoſophers have had ſo much difficulty to explain? It is certain that the figure of the earth is not round, as was formerly imagined, but oblong. This has been diſcovered by exactly meaſuring the degrees of the meridian from one extremity of *France* to the other, that is, from the northern to the ſouthern part. One pole is about thirty-two or thirty-four of our leagues longer than the other; ſo that its form is that of an egg. It is even a little longer from the equator, towards the arctic pole, than from the ſame equator towards the oppoſite pole, at leaſt it is heavier, ſince from the point where, in its annual circuit round the ſun, it cuts the equinoctial, entering into the northern part, till its return to the ſame line, it turns ſix or ſeven times round its axis, oftener than in the ſouthern part. This greater length in one of the poles, is the true reaſon why the globe of the earth cannot vary its ſtate in turning round its own axis, and round the ſun. Thus to explain this ſtability, it is no longer neceſſary, as formerly, to have recourſe to theſe ſubtile matters and currents of air, ſuppoſed to paſs from one pole to the other. The figure of the earth alone, and its greater weight towards the arctic, than the oppoſite pole, is the only reaſon why it cannot change

its axis, and incline more to the north in raiſing itſelf as much towards the ſouth pole.

The globe then of the earth is like a ſpindle placed over a baſon of water at reſt, and drawn by a perſon at one of the edges by a thread wrapt about it. It would turn in ſuch a manner as is natural to ſuppoſe, and in the direction according to which it is rounded; and it would be maintained in this ſtate by the lengthened form of its two extremities; but if one of its ends was larger and heavier than the oppoſite one, it is plain that in rolling, the weightier part would be plunged in the baſon, while the other would be proportionably raiſed above the level of the water.

Now it is thus that the earth ſtruck by the rays of the ſun, which on it produce the ſame effect with the thread on the ſpindle, turns round its own axis in twenty-four hours; that by the greater weight of the arctic pole, it is more depreſſed towards that pole, in the calm air, in which it moves, while the oppoſite pole is elevated in proportion; and that by the lengthened form of theſe two poles, it is kept in this diſpoſition with reſpect to the ſun and other ſtars, without being able to change its axis, either in its diurnal motion, or in its annual courſe, which it performs in three hundred and ſixty-five days and about a quarter. It is for this reaſon that in this ſituation, it runs not through the equinoctial line, but the zodiac which cuts the former, and by that means, twice lays a foundation for the inequalities of nights and days, and the diverſity of ſeaſons. It is alſo for this reaſon that the earth remains longer, and turns ſix or ſeven times oftener round her axis in the northern than in the ſouthern part of the zodiac.

Such are the two motions which one impulſe communicates to the earth. Struck with the rays of the ſun ſhe turns round herſelf in one of our days; and inclined twenty-three degrees towards the arctic pole, ſhe in a year runs through all the points of the ecliptic, at two ſeaſons of the year, ſpring and autumn, cuts the equinoctial line, and in that annual courſe feels the four ſeaſons in her different parts.

Observe alſo, Sir, that when the whole globe was covered with water, which I proved muſt have been the caſe, the equinoctial line was that, or nearly that, through which the earth deſcribed her circle round the ſun; then during the whole year, the days would have been equal to the nights, to the inhabitants, if there had been any, and they were nearly ſuch to the firſt men. Then alſo, all the days of her yearly circuit round the ſun, were nearly equal, but as the waters of the ſea, included much larger mountains in the northern than in the ſouthern parts, whoſe ſeas were conſequently much deeper in proportion as the waters were diminiſhed, the equality which had before ſubſiſted between the two parts of the globe was leſſened; then by the diminution of its waters, the ſouth pole loſt that weight which is preſerved in the north, becauſe theſe ſeas contained mountains ready to appear, whoſe weight ſtill ſubſiſts. Thus in the poles of the earth is produced that variation relatively to the poſition of the ſun, and the ſtate of the firmament, of twenty-three degrees, which keeps the arctic pole always as much lower as the oppoſite is elevated. If men were numerous, ſtrong, and active enough to tranſport a ſufficient quantity of ſtones and earth from the northern parts, it is not to be doubted, but they might re-eſtabliſh the equilibrium loſt, reform the ſituation

of the globe, and change the diſpoſition of nature.

We have alſo lately diſcovered, that there is in the globe of the moon, an inclination of the axis, that is an ecliptic, which though it inclines twenty-three degrees on our earth, is only three in the moon. This inclination certainly proceeds from the ſame cauſe which has produced the ſame effect in this earth, I mean the diminution of her waters. It is pretended that the ecliptic formerly inclined more upon the earth, and that ſince a certain time it has approached one degree, to the equator: The reaſon of this is eaſily comprehended, if from that time we ſuppoſe there is more earth collected in the ſouthern ſeas, than there was formerly, the greater or ſmaller inclination depending, as I have ſaid, on the greater or leſs weight found in the two poles.

We alſo obſerve a variation in the length of the annual circuit of the earth round the ſun, and even in that of her diurnal motion. This is what makes the natural day ſhorter at the equinoxes, and longer at the ſolſtices; ſo that the months of *December* and *June*, are longer about 20 minutes than thoſe of *March* and *September*. But this variation proceeds always from the diminution of the waters of the ſea, and from this, that in ſome parts of the globe ſhe has uncovered grounds, while in others ſhe ſtill covers many of its parts.—In a word, as there is more land than ſea, under the equinoctial line, the globe being more ſtrongly ſtruck by the rays of the ſun, when it preſents its terreſtrial, than when it ſhews its aquatic parts, where the force of theſe rays is blunted and loſt, it then turns more quickly than at the ſolſtices, where there are more ſeas; and it turns with more

velocity at the ſummer, than at the winter ſolſtice, becauſe the terreſtrial parts of the ſouth-pole are even now interſperſed with more ſeas. Thus the change of the conformation in the globe of the earth by the diminution of the ſea, is the cauſe of the variation of the time, which ſhe protracts, according to the calculations of our antient aſtronomers, to perform her annual courſe round the ſun. This variation has laid a neceſſity for the reformations and retrenchments hitherto made in our calendars, and will prove the cauſe of the ſubſequent reformations, which may alſo depend on the variation which will happen in the force of the ſun's heat, which muſt neceſſarily be daily weakened more and more.

PERMIT me, Sir, continued our philoſopher, to add to thoſe obſervations, ſome on the ſtate of the heavens. The hiſtories, both of the moſt remote and modern times, inform us, that ſome ſtars have diſappeared, while others have ſhewn themſelves; that little ones have become large, while ſuch as were large have become little. The conſtellation called *Pleiades*, for inſtance, was firſt compoſed of ſeven ſtars, though we can now count but ſix*.—We have loſt one in the leſſer *Bear*, and another in *Andromeda*; but ſince 1664, we have diſcovered two new ones in *Eridanus*; and there are at preſent four towards the pole, of which the ancient philoſophers have not ſpoken. There are other ſtars which ſometimes appear, and afterwards ceaſe to ſhew themſelves. In 1572, there was a new one diſcovered in the conſtellation of *Caſſiopeia*, with a more reſplendent light than the others; it after-

* Pleiades ante genu ſeptem radiare feruntur:
Se tantum apparent, ſub opaca, ſeptima nube eſt.
Ovid. Metam.

wards diminiſhed, and totally diſappeared at the end of two years. In 1601, there appeared one in the breaſt of the *Swan*, but twenty-five years after it was not to be ſeen; three years after it ſhewed itſelf in the ſame place, but daily diminiſhed ſo conſiderably, that two years after it was no more to be found; but at the end of other five years, and in 1636, it again appeared, though much leſs than at its former appearances. That in the neck of the whale, and another in the girdle of *Andromeda*, have in like manner appeared and diſappeared ſeveral times.

Besides theſe phenomena, the hiſtories of almoſt all nations mention a great number of comets, which have appeared at intervals, ſome large and ſome leſs, ſome in one, and others in the oppoſite part of the heaven, ſometimes for a long time, and at others only during a few days. Some have been ſeen, which occupied three ſigns of the zodiac, and remained in view for three whole months. A man in the courſe of a moderately long life, muſt certainly have an opportunity of obſerving ſome of theſe bodies.

Among the number of obſervations made concerning the heaven, we may place the ſenſible changes, which teleſcopes ſhew us to happen every day in the numberleſs globes which revolve there. We have remarked ſeveral in the *Moon* and in *Jupiter*, and there is hardly a month in which *Mars* is not ſubject to theſe variations.

Then returning to facts, which we have a better opportunity of knowing, we find in antient hiſtories, that there have been times when men lived a thouſand years, and did not propagate their ſpecies till they were an hundred and fifty years old. Ac-

cording to your own hiſtories, the men of the firſt centuries lived to theſe great ages. Thoſe of the *Egyptians* mention a prince, who, they ſay, reigned a thouſand years over them. Now in meditating on all theſe pieces of knowledge, and combining them with each other, I cannot doubt, but that, without any alteration of that whole, of which the univerſe is compoſed, there is, nevertheleſs, a real transformation of the ſtate and diſpoſition in which we have found it, into another, which will be no leſs ſubject to change.

What has formerly paſſed, and daily paſſes in the ſun, informs me, that he is a globe totally ſet on fire, of the nature of ours, which, as yet, is ſo but very little, and in ſome parts only; that theſe torrents of fire conſume him; that there has been a time when theſe inflamed ſeas, have been covered by the rubbiſh of the ſubſtances, which ſerve as aliment to them; and that we ought to judge thus of the thing, by the ſpots from time to time obſerved in the ſun, and which afterwards diſappear; that the fire continually acts on the matter of which that globe is compoſed; and that a time will happen, when having conſumed the whole of it, it will be entirely extinguiſhed, after becoming inſenſibly weaker in proportion to the diminution of its aliment. The extinction of the ſeventh ſtar ſeen in the *Pleiades*, and that of many others equally well known, and which have diſappeared, render this opinion the more certain, ſince we cannot ſay that theſe bodies have been annihilated. The appearance of certain others, which had not before ſhewn themſelves, alſo confirms me in this opinion; for you cannot certainly imagine, that they owed their origin to a new creation, ſince this would be a prodigy of which nature furniſhes us with no example. We cannot

therefore doubt, but theſe are opaque bodies ſufficiently ſet on fire to become viſible, though they were before imperceptible on account of their ſtate.

The appearance of comets is a new proof of theſe viciſſitudes. I know what moſt of your philoſophers have thought on this ſubject, and how little uniformity there is in their ſentiments. For my own part, I do not doubt but theſe comets are opaque globes, which the ſun, by whom they were governed, has, by the extinction or weakneſs of his fire, whoſe activity retained them in his vortex, ſet at liberty, if I may ſo ſpeak, to ſeek their fortunes elſewhere. Perhaps alſo, as we have reaſon to believe, theſe are the wrecks of the ſame ſun, which paſſing near enough to us to be perceived, remain longer or ſhorter viſible, and appear to have tails, beards, or hairs, according as they approach us more or leſs and reflect to us the rays of the ſun, which ſtrike upon them. I do not doubt, for example, but that comet whoſe tail poſſeſſed three ſigns of the zodiac, was the wreck of ſome broken ſun, whoſe different pieces followed each other, and formed that long chain. I am alſo of opinion, that theſe bodies remain erratic, till paſſing near enough to another ſun, to enter into his vortex, they are there ſtopped by the activity of his fire, which forces them to turn round him.

Now in this event, if they enter into this vortex in a part where there is another ſmaller opaque globe already placed, they carry it round themſelves, whereas formerly it was carried round its own ſun. On the contrary, that which enters into the particular vortex of a larger globe than itſelf, is carried round that large body, and whirling

round it, is along with it carried round the ſun which animates that vortex. For example, if the earth, which is larger than the moon, entered after her into the vortex of the ſun, as I have reaſon to believe, ſhe entered it at the diſtance of the parallel circle which the moon deſcribed round the ſun. There ſhe was ſtopped, and obliged to turn round herſelf and round the ſun at that diſtance. The moon in the mean time performing her courſe, and paſſing into the matter, which turned with the earth, was ſtopped in that particular vortex, and obliged to turn round the earth, whereas before ſhe only turned round the ſun. If, on the contrary, the earth had been placed in this vortex before the moon, this laſt having entered there, at the part which the earth occupied, and falling into the vortex proper to it, was carried round it, and along with it round the ſun. In like manner, if a comet larger than *Mars* ſhould at preſent enter into our vortex, at the parallel circle which *Mars* deſcribes round the ſun, there is no doubt, but that being ſtopt there by the force of the rays of the ſun, and obliged to turn round its own axis, when *Mars*, ſhould come into the matter of the particular vortex of that comet, he would be forced to turn round that new planet, and jointly with him round the ſun. It is thus certainly, that the four ſatellites of *Jupiter* have been engaged in his vortex, and obliged to turn round him in a ſhorter or longer time, in proportion to their greater or ſmaller diſtance from that planet. We muſt think the ſame of *Saturn*. His ring is alſo, perhaps, formed by the wrecks of a broken ſun, which have been engaged in his particular vortex.

Let us return to my opinion of the probability, that our globe entered into the vortex of the ſun, after the moon was placed there, in the parallel of the circle which the moon there deſcribed. I found

this opinion on an ancient tradition of the *Arcadians*, which *Ovid* has preſerved†. You know that this people called themſelves the moſt ancient in the earth; but what is ſurpriſing, they added, that their anceſtors had inhabited it before the ſun and moon appeared to them; and that theſe were made for them. You will, no doubt, ſay, that this pretenſion of the *Arcadians*, ought to be looked upon as an effect of their vanity, or perhaps a ſimple poetical expreſſion which implies no more than that this people was very antient. But beſides that *Ovid* relates this tradition as certain; and that *Pauſanias* alſo ſpeaks of it, it is evident that it was commonly believed, ſince both the *Greek* and *Roman* authors uſed a name for that people, which imported that they were on the earth before the appearance of the moon.

Besides the great care which the *Egyptians*, who were great aſtronomers, and accurate obſervers of the heavens, have taken in their temples which they conſecrated to the ſun, to dedicate altars to each of the planets, and there to place them in the order which they obſerve round the ſun, with their names, their courſes, and the times they take to perform theſe courſes; theſe precautions, I ſay, ſhould incline me voluntarily to believe, that they were intended to eſtabliſh ſo great an event, and to perpetuate the memory of it. But from theſe circumſtances we can only draw conjectures, having already loſt the knowledge of the hieroglyphical characters, which we ſtill ſee engraved round theſe altars, and on the walls of theſe temples.—This event, and the new arrangement of the hea-

† It is in the ſecond book of the faſts, where relating the origin of the Lupercalia, and why the prieſts of *Pan* ran naked in that ceremony, he ſays,

Ante Jovem genitum, terram habitaſſe feruntur
Arcades, & luna, gens prior illa fuit.

vens to us, which happened on that occaſion, were, no doubt, marked there with accuracy.

However this be, if to the tradition of the *Arcadians*, and the precautions of the *Egyptians*, we join what hiſtories inform us of thoſe great ages which men lived to ſeven or eight thouſand years ago; theſe lives of near ten centuries of which your *Geneſis* makes mention, that reign of a thouſand years of a king of *Egypt*, whoſe memory is ſtill ſubſiſting, we will find in the union of heſe circumſtances, a very ſtrong proof of an arrangement of our globe round a ſun different from that which now enlightens us.

In a word, the life of man has never been either longer or ſhorter, as people fooliſhly imagine. The duration of it is founded on the nature of things. If we could admit any difference, it would be in favour of the wiſe and moderate men of the preſent generation. Have not they more means and opportunities of preſerving and prolonging their lives, than our anceſtors had when they inhabited caves, lay upon the leaves of trees, or upon the hard ground, and only lived upon the herbs and fruits which the earth produced ſpontaneouſly, and without culture. On the other hand, theſe numberleſs years for which we have endeavoured to find a meaſure which ſhould approach to probability, were not certainly lunar years, ſince, upon that ſuppoſition the difficulty could not be removed. Neither were they years of one ſingle moon, as ſome of your authors have imagined; much leſs were they years of three months, as others of them have aſſerted. The one of theſe terms is too ſhort, and the other too long. We are not, generally, capable of propagating our ſpecies when we are a hundred and

twenty, or a hundred and forty months old; and the propagation would be too late, if it was not to happen to the end of four hundred and fifty months. There would alſo be nothing extraordinary in a life of a thouſand moons. Beſides a period about three thouſand months would not agree with the laws of nature, which change or vary but very little. Hence I draw this conſequence, that the years then were meaſured, as they are at preſent, by the duration of the earth's courſe round the ſun: But I think that this duration was a mean between the time of one moon and our three months; ſo that in that time the earth performed her annual courſe. The ſun which then regulated her, was certainly leſs than the preſent ſun, or more probably, the activity of his fire was ſo weak, that our earth could perform her circuit round him in ſixty days, or ſomewhat leſs.

This fire dying was alſo the cauſe of theſe continual rains which occaſioned that deluge whoſe waters covered, I do not ſay, perhaps, the whole earth, but a great part of the land. This deluge was felt in *Greece* and in *Egypt*, as we are informed by the hiſtories of theſe countries*. But the

* It is pretended that there have been ſeveral deluges, which have ſo overflowed ſome countries, that hardly could a few of their inhabitants be preſerved. The moſt ancient are thoſe of *Oſyris* and *Ogyges*, and the moſt famous is that of *Deucalion*. All theſe deluges well conſidered, may perhaps be found to be but one. No one is ignorant of the fable of *Deucalion* and *Pyrrha*. *Juſtin* explains it in the ſecond book of his hiſtory. In the time of *Amphyction* king of *Athens*, a deluge, ſays he, deſtroyed the greateſt part of the people of *Greece*, only they eſcaped who could retire to the mountains, and a few others who in boats conveyed themſelves into *Theſſaly*, where *Deucalion* then reigned. Thus it is ſaid of him, that he reſtored the race of mankind. We may alſo ſay, that by theſe ſtones which were animated in the hands of *Deucalion* and *Pyrrha*, the

mountains of *Theſſaly* and *Arcadia*, and that of *Mokatan* which borders on the *Nile*, proved ſhelters to the inhabitants of theſe lands. The *Arcadians* have preſerved to us the memory of the change then made in the heavens with reſpect to the earth, and of the appearance of a new ſun and a new moon. The *Egyptians* were, perhaps, willing to tranſmit the ſame fact to us. Your hiſtory alſo tells us, that after the deluge, the life of man was reduced to a hundred and twenty years. Hence we ought to conclude, that the earth having changed its motion and its ſun, a hundred and twenty circulations round the preſent ſun, were the meaſure of nine hundred and fifty, or thereabouts, of thoſe which ſhe deſcribed round the former ſun. In a word, almoſt a thouſand years, which ſome of your patriarchs lived, is a term infinitely above the life of man, if you count theſe years by the number of circles which the globe of the earth deſcribes, at preſent, round the ſun. On the other hand, to count theſe years by the moons, is, as I have ſaid, too ſhort a meaſure for a hundred and twenty of theſe revolutions, to which *Moſes* aſſures us that the life of man was bounded after the deluge. We muſt therefore chuſe one of theſe opinions, either the years were counted by moons before the deluge, and had a longer meaſure after that grand event, which *Moſes* ought to have told us, which however he has not done: or we muſt grant, that as it was not by the duration of a moon, that the year was counted ſince the deluge, ſo it muſt have another meaſure before it. Now it is evident, that this meaſure can be no other, before as well as after the deluge, than the courſe of the earth round the ſun, according to which men did

ancients intended to repreſent the barbarity of that firſt race of men ſprung from another, and which owed its origin to this event.

not die till the age of nine hundred years, though at the ſame time they did not live longer than we do now. Hence we ought to conclude, that before the deluge, the circle of the earth round the ſun was much ſmaller than that which it deſcribes at preſent; and that conſequently it changed its motion on that occaſion. Now it is evident that this could not happen, but by that tranſmigration from one vortex to another, of which *Pauſanias* and *Ovid* have preſerved the memory.

If the hiſtories of the *Chineſe* really contain, as we are aſſured, events which have happened for forty thouſand years paſt, I do not doubt but we ſhall there find teſtimonies of this tranſmigration too memorable to have been omitted. But theſe forty thouſand years will not be all of the ſame length, as you muſt imagine from what I have ſaid, that a hundred and twenty of our years make near a thouſand of thoſe which preceded the change of motion in our globe. Theſe annals of forty thouſand years would not therefore make ten thouſand of our preſent years, but they would be ſufficient to confirm the truth of this grand event.

This is ſo much the more credible, becauſe by the nature of our ſun which is inſenſibly conſumed; by the appearance of ſome new ſtars, and the extinction of ſeveral old ones; by the number of comets which have been ſeen by our anceſtors, or which we ourſelves have ſeen; by the preſent ſtate of our earth, which convinces us, that this globe has been in a very different diſpoſition, we cannot doubt that this whole ſyſtem which we ſee, and this fine order which we admire, are ſubject to changes; and that what we know to have happened, or what we ſee ſtill to happen, may continue to be repeated; that the ſuns are extinguiſhed

after a certain duration, and that opaque bodies are inflamed, as we know that this has already happened; that the opaque globes included in the vortices of the suns which are extinguished, become erratic, in the extent of the vast empyrean heaven, till they are carried into another vortex, where they are stopped by the activity of the fire of that sun, as they were formerly in that of their own, and as all those have been which we call comets; that what has happened to them may perhaps before have happened to the planets of our vortex, as well as to the suns by which they were governed, and may afterwards happen both to our sun, and to the planets which he governs; that, in fine, in these revolutions, our planets entering into other vortices, are with respect to the principal star, in dispositions, different from that in which they are at present, with respect to our sun, whether they carry smaller globes along with them, whether they are themselves carried off in the particular vortex of a larger globe, or, in a word, whether they are placed at a greater or a smaller distance from a new sun.

Now in these differences, the waters with which they are now covered, will be augmented or diminished according to their greater or lesser proximity to the star. Thus we see the waters of the globe diminished, which have certainly covered it totally, as I have shewn, and which have perhaps been collected there, in a position with respect to a preceding sun different from that in which they now are. No part of matter is lost*, and these waters now wanting, which we know to have surmounted the highest of our mountains, have not been an-

* Neque enim adaugescit quidquam neque deperit inde,

nihilated; they ſubſiſt in whatever places they have been carried to. The diminution of the waters of our ſeas, proceeds from a true evaporation, which elevates them to other globes.

The ſubſtances which the rays of the ſun carry off from the globes next him, the duſt, the particles of water, with which they are loaded in making theſe globes move, and in paſſing with rapidity to the moſt diſtant; what theſe rays contain of the proper ſubſtance of the ſun, which they devour, whence they proceed and are darted; all theſe, I ſay, are carried through the fluid of the air to the extremity of the vortex, where the activity of theſe rays being at laſt dead and languid, has no more force than the rays of the ſun reflected from the moon upon us in the night-time.

It is there, that in the middle of an air almoſt without motion, the rays are deprived of the ſubſtances with which they are loaded. It is alſo at this extremity of the vortex where the body of the extinguiſhed ſun, which ſhall have been puſhed thither on account of its lightneſs, receives the depoſitions of theſe matters, and by their means recovers what it had loſt of humidity and weight while it was inflamed. It is there, that enriching themſelves with the ſpoils of others, theſe globes are again covered with water, and with it regain ſlime, which reſtores to them the weight and ſubſtance they had loſt. It is in the boſom of theſe waters that the aſhes remaining after the burning of theſe globes, ſands, metals, and calcined ſtones are rolled and agitated by the currents of the new ſeas there collected. Of all theſe, upon the cruſt of the ſpongeous part, there are new beds formed, ſome of fine, and others of coarſe ſand; ſome of clay, and others of ſlime and mud, of different

qualities and different colours. Theſe beds will, one day, compoſe quarries of ſtone of different kinds, ſuch as marble, ſlate, mines of all kinds of minerals, and with them the hills and mountains of theſe globes, when by the ſucceſſion of time, and the viciſſitudes which ſhall happen in the vortices, the waters in which all theſe things ſhall be formed and arranged, ſhall ceaſe to increaſe, and begin to diminiſh; for it is by their diminution that the mountains of theſe new earths will appear, juſt as it happened in ours.

It may however happen in the diſſolution of a vortex, that a globe already inhabited, may be placed at ſuch a diſtance from the ſtar of the vortex where it is ſtopt, that this globe, whoſe waters were before in part diminiſhed by its poſition, may acquire new waters inſtead of loſing what it had; that its waters may augment ſo as totally to cover it, and deſtroy its inhabitants; and that thus, without paſſing through the ſtate of fire, it may be augmented by new ſlime. If we could dig to the centre of our globe, and there run through the various arrangements of matter of which it is compoſed, we ſhould be able to judge whether it has been ſeveral times ſucceſſively and totally covered with water after having been inhabited, without having been the prey of the flames. In this caſe we ſhould find in the globe, the veſtiges of ſeveral worlds arranged over each other, entire cities, durable monuments, and all that we now obſerve on the ſurface of our globe; for we muſt think, that if in the preſent ſtate our globe ſhould be totally covered with the waters of the ſea, before it is inflamed, all that we now ſee would be buried under the ſlime, ſand, and mud, of the ſea, with which it ſhould be covered; that theſe waters happening afterwards to diminiſh, there would ariſe

from them a new world ſituated upon this, which would be unknown to its inhabitants, as we are ignorant of that which has preceded ours, and which is too deeply buried in the entrails of the earth, for us to arrive at the veſtiges of it.

In order the better to make you comprehend the different manners in which theſe changes may happen to the globes, permit me, Sir, to put you in mind, that in our preceding entertainments I have diſtinguiſhed two kinds of mountains, ſome of which I have called primordial, and which have been formed in the boſom of the waves, when they covered the whole ſurface of the earth, others which are only, as it were the daughters of the former, and which, ſince the appearance of the firſt grounds, have been formed of their wrecks. I have obſerved to you, that the ſea not being capable of producing herbs, plants and fiſh, except where ſhe was ſhallow, that the rays of the ſun might render them fit for fecundity, theſe large and primordial mountains included no extraneous matter, that they were only compoſed of ſand finer or coarſer, without any mixture of all theſe heterogeneous bodies found in the other.

It was then, after the appearance of theſe firſt grounds, when they were clothed with herbs and plants, and when the ſea was ſtocked with ſhell-fiſh and others, that theſe poſterior mountains were formed out of the wrecks of the former, and of the different ſubſtances which the currents of the ſea contained. It is alſo in theſe poſterior mountains that we find ſo many extraneous bodies, ſuch as plants, herbs, trees, fiſh, and ſhells. It is in them we meet with metals, minerals, precious ſtones, all the ornaments of the globe, commodities of life, the ſupport of luxury, the ob-

jects of ambition and avarice. Now it is by the compoſition of theſe laſt mountains, that in the duration of their exiſtence, and the ſtate of their fertility, the opaque globes contract what will one day make them ceaſe to be opaque.

WHENCE, in a word, do you imagine that the volcanos draw their origin, if not from the oils and fats of all theſe different bodies inſerted in the ſubſtance of theſe mountains? All theſe animals which live and die in the boſom of the ſea, (and ſome of them are very large, ſuch as whales, from which we obtain ſo great a quantity of oil) ſo many rotten trees, plants, and herbs, make a part of theſe mountains which the ſea has raiſed. It is with theſe oleous and combuſtible ſubſtances, that the mountains of *Veſuvius* and *Ætna*, and ſome others, which like them vomit torrents of fire, have their entrails filled. Is the ſea-coal found in *England* and ſo many other countries, any thing elſe but a collection made by the ſea in the places where it is found, of herbs and the fat of fiſh? Is it not this which renders it combuſtible, as well as of a bad ſmell? It is to theſe volcanos, whether viſible or not, that we owe all our minerals and metals, our gold, ſilver, copper, lead, braſs, iron, ſulphur, allum, vitriol, and quick-ſilver, which their fire has fixed to the chimnies or vents which their flames had made. It is in imitation of theſe that chymiſtry has been formed, and improved, and that labouring to diſcover the ſecret of transforming metals, and changing eſſences, we have found out that of impoveriſhing ourſelves, in ſeeking to become rich; a juſt puniſhment for our folly!

BUT not to ſay more of this vain and dangerous ſcience, to which, however, we owe the diſcovery

of a thouſand curious and uſeful ſecrets, we muſt be perſuaded that it is theſe vulcanos which inſenſibly produce the extinction of the ſpirit of life in globes, and at laſt their total conflagration; for though they are not equally combuſtible in all their parts, yet the parts which are really ſo, at laſt burn thoſe which are leſs ſo, ſuch as ſtone and marble. Such is the order eſtabliſhed by the author of nature, to render his works eternal; the fat and oil of all the animals, fiſh and other bodies, which may ſerve to the inflammation of opaque bodies, are collected in certain places, where by the ſucceſſion of time, theſe bodies are ſet on fire. Hence ariſe vulcanos, which at laſt communicate with each other, inflame the globe, deprive all its animals of the power of generation, and make a true ſun of it. This new ſun, by his heat, communicates to other opaque globes that power of generation which he has loſt himſelf, till by his activity having conſumed all that which in his ſubſtance is proper to entertain this prodigious heat, he is weakened, extinguiſhed, and returns to his former opaque ſtate.

It is alſo to be obſerved, that in proportion as the ſun is extinguiſhed, he muſt naturally, on account of the lightneſs he has contracted, in the fire which has penetrated and devoured him, be carried to the extremity either of his own or ſome other vortex. If it is to the extremity of his own, our ſun for example, being extinguiſhed, would be carried behind the planet moſt diſtant from the center which he poſſeſſes. This center would be then occupied by *Mercury*, as being the neareſt planet, and conſequently the moſt diſpoſed to be ſufficiently inflamed to ſucceed the ſun. At the ſame time the other planets would be brought nearer this center of the vortex, and would come ſtill

nearer to it, when the fire of *Mercury* being extinguiſhed, and his wrecks carried behind the former ſun, *Venus* would poſſeſs his place. This ſucceſſion continuing thus till *Saturn*, the moſt diſtant planet of the vortex, was become the ſun and mover of it, after the Earth, the Moon, *Mars*, and *Jupiter* had been ſo in their turns, it would happen that the moſt diſtant of the planets would gain inſtead of loſing by this means; that is, it would acquire the waters and ſubſtances carried off from the others, till approaching towards the center of the vortex, it would ceaſe to acquire any more and begin to loſe. Thus we have reaſon to believe, that the waters of *Saturn* are ſtill increaſing, and perhaps thoſe of *Jupiter* and his ſatellites; but if the ſucceſſion of the earth to the center of the vortex ſhould happen, the waters of *Jupiter* would certainly begin to diminiſh, if they do not already ſo. We muſt think the ſame of *Saturn*, behind whom would be the bodies of the ſun, *Mercury* and *Venus*, which would there receive what *Mars*, *Jupiter*, and *Saturn*, began to loſe.

But if at the extinction of the ſun of one vortex, his planets are carried off with him, without any certain direction, towards other vortices, which is moſt probable, and ſeems to be evinced by comets, the waters of theſe planets will be augmented or diminiſhed according to their arrangement round the ſun, which ſhall ſtop them. It is in the like event that our earth may be totally covered again with waters, inſtead of continuing to loſe them, according as it is placed at a greater or ſmaller diſtance from the ſun. Chance is by no means the diſpoſer of theſe arrangements. The heavier a planet is, the more it is in a condition to approach to the ſun of the vortex; on the contra-

ry, the lighter it is, the greater its bulk will be in proportion, like the bodies of extinguiſhed ſuns; the further alſo the rays of the ſtar, which poſſeſſes the center of the vortex, puſh it, only admitting it to the extremity, and that part where their activity has almoſt loſt all its force.

Thus the future fate of our earth is uncertain: Before our ſun is extinguiſhed, ſhe may be totally burnt, form a particular and ſeparate vortex, take from the ſun ſome of his planets, and perhaps acquire ſome from other neighbouring vortices. If on the contrary ſhe is totally burnt, ſhe may continue to loſe her waters by the arrangement ſhe may acquire in another vortex, if ſhe is placed at too great a diſtance, her waters will be augmented, ſo that ſhe will be covered by them totally or in part, according to the duration of her ſituation at that time. But whatever may be the fate of the earth and her inhabitants, there is reaſon to believe, that in the numberleſs multitude of globes contained in the univerſal ſyſtem, ſome inflamed and others opaque, of which we perceive but the ſmalleſt part, there will always be ſome whoſe waters and matter will be augmenting, while a proportional diminution will be continued in others. There will always be ſome of them which will be totally inflamed, and ſerve as ſuns to thoſe which are not inflamed; others will be extinguiſhed, and paſs into diſpoſitions proper to the ſtate in which they were before they were burnt.

An *Arabian* author relates, that among the different opinions of the philoſophers of his nation, concerning the antiquity of this world, its duration and end, there was one who aſſerted, that the earth had been formed fifty thouſand years before it was inhabited, that it had been inhabited

fifty thouſand years, and ſhould continue to be ſo for fifty thouſand more. But how can we otherwiſe than by the conſequences I propoſed, conjecture how long it remained a deſart, how many years it has been peopled, and how long a time it may ſtill be inhabited. It is in the works of nature, and in the faint notions which remain to us, of ſome ſingular events which have happened in the heavens and the earth, that we ought to ſeek the hiſtory of a very remote antiquity, and the knowledge of a futurity which will perhaps be ſtill more extenſive. We cannot otherwiſe hope to learn the ſtate of two extremities ſo diſtant from us as theſe.—This is the ſtudy to which, in imitation of my father and grandfather, I have applied myſelf from my earlieſt youth. My ſentiments, with reſpect to future things, are more flattering and alluring for men than any hitherto propoſed to them, ſince without deſtroying the opinion with which they are prepoſſeſſed, that the world will be deſtroyed by fire, I leave them, the hope of a poſterity, which will perhaps be more durable.

I HAVE done more; for I have even informed them what will become of the globe which they inhabit, when after ſeveral viciſſitudes, it ſhall have been conſumed by fire, and I have proved, that like the phœnix it will ſpring out of its own aſhes. In a word, though this does not at firſt appear ſo probable as the other changes which ſhall previouſly happen to the earth, yet this conſequence is not leſs neceſſarily deduced from the diminution of the ſea, and the compoſition of our mountains, for if theſe have been really formed in the ſea, the earth has been totally covered with her waters. Now this could not have happened, but in a poſition and arrangement of the globe, different from that in which it is at preſent, and at ſo great diſtance from

the ſun, that her waters muſt have augmented inſtead of being diſſipated. It is therefore manifeſt that the globes change their ſtate and diſpoſition; that in a certain arrangement, they are covered with water, while in another poſition theſe waters are diminiſhed, which lays a neceſſity for all the viciſſitudes which I have attributed to the globes, even that in which having been conſumed by fire, and ſerved as a ſun to other globes, they are conveyed into places where they recover their weight and moiſture.

These tranſitions from one ſtate to another, from luminous to opaque, and from the latter to the former, are, as I have irrefragably proved, by ſtars which I have ſaid, diſappeared, and others which have appeared afreſh; for we cannot ſay, that the appearance of ſtars lately diſcovered, is the effect of a new creation, nor that thoſe which have diſappeared, have been annihilated. You need not therefore doubt, but the remains of theſe laſt bodies exiſt in nature; when experience has convinced you of the diminution of the ſea, you muſt with me allow, that the waters carried off from her, exiſt elſewhere; that in changing their place they carry with them all the ſubſtances which they contained; and that the whole of this, on which the rays of the ſun, act, is carried to the greateſt diſtance from the ſtar, and is depoſited and received by the bodies which exiſt there. It was perhaps there that our earth formerly received the immenſe waters, with which the higheſt of our mountains were covered; and it is in a ſimilar poſition, that in the ages to come, after having paſſed through the fire, her dry and arid remains may recover the waters and ſubſtances which they may have loſt.—Theſe are infallible viciſſitudes, and muſt neceſſarily be admitted on the principles which I have eſta-

bliſhed ; they will follow each other without interruption. The opaque bodies will become luminous, and, as I have before obſerved, of luminous theſe will become opaque. Their matter and their waters will be augmented, when they are the greateſt diſtance from the ſtar of the vortex in which they are placed. They will augment, on the contrary in a diſpoſition which will render them nearer to this ſtar. They will at firſt become habitable, and then be inhabited till they ceaſe to be ſo, and be totally burnt. Both the opaque and luminous globes contained in this vaſt univerſe, will undergo theſe alternatives a hundred and a hundred times. They will paſs ſucceſſively from one of theſe ſtates to another, changing their poſition and vortex.— Though theſe viciſſitudes are often concealed from our eyes, they are not the leſs certain nor perhaps the leſs frequent, in this immenſity of globes, to which our higheſt imaginations cannot attain.

In a word, Sir, cried I, you had reaſon to ſay, that you would explain to me things of ſo ſingular a nature that I ſhould be ſurpriſed at them. I confeſs to you, that notwithſtanding the ſmall foundation I find in your ſyſtem, I am charmed to hear you ſpeak with as much aſſurance of what you think paſſes in the vaſt extent of the univerſe, as if from infinite ages, flying from vortex to vortex, you had been an eye-witneſs of what you relate concerning them. Go on, Sir, to unveil your myſteries to me : Tell me what you think with reſpect to the ſtate of the fixed ſtars, which always preſerve the ſame order, and ſeem to me to float by chance in the extent of this grand whole, or in this liquid of the air, as you call it. I hope you will alſo deign to give me your opinion of the origin of men and animals, which in your ſyſtem, are

no doubt the productions of chance, a doctrine which neither my religion nor my reaſon permit me to believe. I am already perſuaded that what you ſhall ſay to me, on theſe two ſubjects, will be neither leſs curious nor ſingular, than all you have hitherto told me.

I own to you, replied our philoſopher, that I am as much perſuaded of the truth of theſe viciſſitudes, with which I have entertained you, as if for a long time running through the ſtate of the heaven, and the globes it contains, I had with my own eyes ſeen theſe different revolutions. But I ought for my juſtification to add, that if I embrace ſo extraordinary an opinion, it is not till after more than thirty years meditations and reſearches, doubts and objections, which I have formed to myſelf, or which have been propoſed to me by others; after the moſt exact ſtudy of the philoſophers, and of the different ſects upon that ſubject; and in a word, becauſe I have found nothing more conformable to the events which have hitherto happened in the heavens and the earth, more agreeable to the invincible proofs we have of the diminution of the ſea, to the conformation of our globe, to the hiſtories and traditions which remain, and in a word, to reaſon; ſo that my aſſurance in what I have related to you, does by no means deſerve to be treated as temerity.

As to the queſtions you propoſe to me, I think it is eaſy to conceive how the ſtars are ſtopped or fixed in an expanſe, ſuch as that which the heavens preſent to our views and our imaginations. This expanſe is what I call the fluid of the air, or more properly the vacuity through which it flows, or the tranquil ſcene of the paſſage and motion of every thing that exiſts.

I HAVE told you that the inflamed globes have not been ſo always, but that from an opaque they have paſſed to a luminous ſtate. I muſt add, that in this ſtate, they have acquired a proper motion, which has made them turn round their own axis, and fixed them in thoſe parts of the vacuity which they poſſeſs. It is nearly thus that a bowl or wheel of artificial fire, placed upon a large ſheet of calm water, and kindled, would not change its place ſo long as its fire laſted, and made it turn round itſelf. It is in this manner, that the ſtars ſtopped at that part of the vacuty where they are ſet on fire, turn there, and will always do ſo till the extinction of the fire, which penetrates them, without receding from their poſition.

BUT in the arrangements of all theſe burning bodies, which at preſent exhibit to our view a certain ſtate of the whole ſyſtem, an univerſal change will happen at the end of a particular time; all the ſtars will be extinguiſhed, perhaps, one after another, as ſeveral of them are already, of which we ourſelves have been witneſſes. New ones will ſucceſſively ariſe by means of opaque globes which will take fire, and theſe will not always ſhew themſelves in the ſame parts where the others have diſappeared. Thus the ſtate of the heaven, which now ſeems fixed to us, will be totally changed, and in a time which we cannot aſcertain, it will not be the ſame that it is now. It will be ſo renewed, that our poſterity ſhall not perhaps ſee one of the ſtars which we at preſent obſerve.

IF comets in paſſing near us ſeem to keep a certain road, conform to the courſe of our planets; this happens, becauſe, approaching near our vortex, they participate of the motion which the ſun communicates, to the globes with which he is ſur-

rounded. They are alſo, no doubt, aſſiſted by the influence of the rays of ſome other contiguous ſtars, which by the ſubtile matter flowing from them, form in the ſpaces by which they are ſeparated from ours, a kind of currents, by which theſe comets perform their motions rather in one direction than another. After all, there may be other natural reaſons for the arrangement of inflamed globes, of which we cannot fix the number. It is no affront to our weak and limited underſtanding, not to attain to a juſt knowledge of things ſo prodigiouſly diſtant from our eyes as theſe, and of which to judge ſoundly, the aſtronomical obſervations of an infinity of years would be neceſſary.

Hugenius, continued our *Indian*, has compoſed a treatiſe on the plurality of worlds, in which he pretends to prove, not only that there are men and animals in our planets and their ſatellites, but alſo, that theſe men have the ſame knowledge as we in aſtronomy and geometry, in all the arts we know, and in all the ſciences we have acquired. The author has entered into a detail in which he is more ſucceſsful in ſhewing his learning, than in convincing the reader that in the habitable globes, there are men of our ſpecies, and that among them we find all the ſciences of which we are maſters. It is not impoſſible that there may be globes where all theſe may be found even in greater perfection than in ours; but even ſuppoſing all theſe globes inhabited, it is very probable that there are many of them in which moſt of the arts and ſciences acquired by the men of our globe, are abſolutely unknown.

In a word, whence have we learned that the moon was a globe ſuch as our earth; that there were lands and ſeas, and mountains and vallies in her; that ſhe had, like ours, regular days and

nights; that conſequently ſhe might be inhabited, her ſeas ſtocked with fiſh, her lands with animals, and perhaps a ſpecies of reaſonable creatures either approaching to them, or differing from them? Whence, I ſay, could we derive this knowledge, if not from the diſcoveries we have made in that planet?

If then as the Earth has the moon for a ſatellite, as *Jupiter* has four, as *Saturn* has five, and perhaps a much greater number in the ring with which he is ſurrounded, all the opaque globes had in like manner ſatellites; or if theſe globes were at leaſt near enough to each other, that people might from one diſtinguiſh what happens in another, the opinion of *Hugenius* would be much more ſupportable. But are the inhabitants of *Mercury*, if there are any who can live in ſo great a proximity to the burning ſun, round which they turn, ſo near to us or *Venus*, as to know the conformation of our globes, or judge whether they are ſimilar to the ſmall globe which they inhabit? Are the inhabitants of *Mars* and *Venus*, to whom our earth, and its ſatellite, muſt appear no larger than their planets do to us, able to make this compariſon of our globe with their own? It is however from the knowledge we have acquired of the conformation of the moon, that we draw this natural conſequence, that all the planets, and all their ſatellites which we obſerve in the vortex of our ſun, are probably compoſed in the ſame manner, and conſequently habitable, and may be inhabited. Hence we muſt conclude, that if the ſuppoſed inhabitants of the other planets cannot have the ſame aſſiſtance, it is very probable that they cannot equal us in this part of our knowledge.

It is true, that if by this means we have ſome advantages over the pretended inhabitants of ſeveral globes which have not ſatellites like ours, yet we may in ſome ſuppoſe men, who if they really exiſted, muſt infinitely ſurpaſs us in knowledge. I ſhall on this occaſion relate to you, added *Telliamed*, the diſcourſe of an *Engliſh* nobleman, whom I met, when at *London*, walking one evening in St. *James's* park. You will find him no leſs prepoſſeſſed than *Hugenius* in favour of a plurality of worlds.

Our converſation turned on the nature and ſpecies of creatures, which he pretended inhabited not only our planets and their ſatellites, but alſo that numberleſs multitude of ſmall opaque globes which roll in the vortices of all the ſuns of which the milky way is compoſed. My friend pointing with his finger at *Jupiter* and *Saturn*; do you ſee, ſaid he, theſe two ſtars, and eſpecially *Saturn*, which is nine or ten thouſand leagues in diameter? Could you believe that he turns round his own axis in ten of our hours? This motion is certainly prodigious, and muſt, no doubt, make the heads of his inhabitants giddy, ſince in the ſpace of an hour his ſurface runs over more than three thouſand leagues. But what is no leſs remarkable is, that the inhabitants of this planet are ſo near the firſt moon that turns round it, that this moon deſcribes her circle in a day and twenty-one hours. Conſequently ſhe borders ſo near upon *Saturn*, that the inhabitants of both places may from the tops of their higheſt mountains almoſt ſhake hands with each other, or at leaſt ſee and ſpeak together. For a ſtill ſtronger reaſon, the inhabitants of this firſt moon may converſe with thoſe of the ſecond, which performs her courſe round the principal planet in two days and ſeventeen hours. Beſides,

continued he, the inhabitants of the firſt moon might jump into *Saturn*, and thoſe of the ſecond jump into the firſt; at leaſt theſe three people, if they have like us the uſe of teleſcopes, and ſpeaking trumpets, may eaſily ſee one another, and carry on a converſation together. In a word, you cannot deny, continued he, but they can at leaſt reciprocally perceive the large cities built in theſe three globes, and the veſſels ſailing on their ſeas; neither can you refuſe that they hear from one to another, the noiſe of cannon, and eſpecially that of thunder, formed at the extremities of the air which ſeparates them.

Another *Engliſhman* ſtill improved on this, and called the milky way the ſummary of ſuns and opaque globes. They were there, ſaid he, ſo contiguous to, and ſo mixed with each other, that they were ready to touch one another in the circles which they deſcribed round the ſuns by which they were governed, ſo that their reſpective inhabitants muſt know one another, and pay frequent viſits. He even took it highly ill, that I ſhould believe nothing of his ſyſtem, and only applaud ſo ſtrange a propoſition by a ſmile.

What a third told me of the proximity of *Saturn* to his firſt moon; and of this to the ſecond; of that of *Jupiter* to his firſt ſatellite, &c. appeared more rational and probable. If we have drawn, ſaid he, ſo much knowledge from the proximity of the moon to our earth, eſpecially ſince the invention of teleſcopes, what advantages over us have not the inhabitants of ſeveral globes ſo near each other, and within the reach of ſo great a number of luminous bodies? How much more eaſy is it for them to be better acquainted than we, with every thing which happens in the opaque globes, and

in the ſtars, whether, when there is a new one formed by the inflammation of one of theſe bodies, or whether others have their fires extinguiſhed, which with their eyes they gradually obſerve to conſume the matter which nouriſhes them, and which are inſenſibly weakened in proportion as this is conſumed?

These degrees of knowledge, ſaid our philoſopher, cannot be denied to the inhabitants of theſe globes ſo contiguous to each other, if they are inhabited. As for us, continued he, we cannot hope to arrive at ſuch knowledge, but by the extinction of our ſun, and by the tranſmigration of our globe into another vortex. Then if what I have explained to you ſhould reach poſterity, nothing of what I have ſaid, as likely to happen, could ſurprize our offspring, ſince they would be appriſed of the future changes which time will produce in the ſtate of the heavens; that is, in the ſtars and opaque globes deſtined for an eternal paſſage from obſcurity to light, and from light to obſcurity.

But though nothing durable can be promiſed amidſt theſe continual viciſſitudes, we ought however to hope, that whatever may happen on the earth, till the human ſpecies is totally deſtroyed, theſe pieces of knowledge will not be abſolutely loſt. If in this age there are learned men, who have found that the univerſe may include many worlds, that certain ſtars have diſappeared, that new ones have ſhewn themſelves, that theſe loſt ſtars were ſo many extinguiſhed ſuns, and that the new ones proceeded from the inflammation of opaque bodies; ſo long as the earth is not deſtitute of men, there will always be ſome, who, attaining to the knowledge of theſe things, will teach their fellow-mortals what I have this day explained to you.

The men who ſhall live in the remote ages, may from the diſcoveries of ours, and from future events, judge more ſurely than we, of the diminution of the ſea. Thus upon the eſtimation of this diminution, meaſuring the deepeſt ſeas they may judge of the time in which they muſt be totally exhauſted, independently of the weakening of the ſun's fire, which may be exhauſted, and of the multiplication of our volcanos, which are already very numerous in *America*.

From what I have ſaid, Sir, you muſt conclude that the earth may equally loſe its inhabitants, either by the total diſſipation of the waters of the ſea, which are the ſources of the rivers and rains neceſſary to fertility, or by the general kindling of its volcanos, and conſequently the burning of the whole earth, or by ſo conſiderable a weakening of the fire of the ſun, that at his extinction the ſea muſt univerſally cover it. Now if the deſtruction of the human race is to happen by a total exhauſtion of the waters of the ſea, the men deſtined to be the witneſſes of it, will retire into profound vallies, and dig wells, in order to maintain fertility, and provide for their ſubſiſtence, or they will paſs towards the poles, where they will long find a freſhneſs, which will be baniſhed from the meridional countries, and a fruitfulneſs which will ſubſiſt in no other parts of the earth.

But if in proportion as the force of the ſun is weakened, or his extinction approaches, the inhabitants of the earth have reaſon to dread a total ſubmerſion, they will not be alarmed. They will build large veſſels, in which placing their flocks and neceſſary proviſions, they will wait for their delivery from this melancholy ſituation by the total extinction of the ſun, and by the paſſage of the

earth into another vortex where her waters may be diminiſhed. In a word, if happily for them, the ſun is extinguiſhed before our globe is ſet on fire, and totally deprived of its waters, our obſervations will aſſure them againſt the total extinction of mankind, and even make them hope, that in a new arrangement of the earth in another vortex, ſhe may find a favourable ſituation, which reſtoring her a part of her waters without drowning her, will preſerve this generation to very diſtant ages.

Telliamed, in a hurry, and without interruption, pronounced this prophecy, with an ardor and enthuſiaſm which almoſt made me take him for an inſpired man. But, added he, I muſt leave you, the night which draws on, obliges me to ſtop; tomorrow I ſhall endeavour to anſwer the queſtion which you have propoſed to me concerning the origin of man.

End of Fifth Discourse.

TELLIAMED;

OR, THE

WORLD EXPLAIN'D.

Sixth Day.

OF THE ORIGIN OF MAN AND ANIMALS, AND OF THE PROPAGATION OF THE SPECIES BY SEEDS.

THE philoſopher kept his aſſignation very early in the morning, and told me that he was that evening to ſet out for *Ormus*. I am come, ſaid he, to take my leave of you; and though the time yet permits me to inform you, as I promiſed yeſterday, what I think of the origin of men and animals, yet I hope you will freely excuſe me for not keeping my word. Beſides, it would be uſeleſs for me to expatiate with you on a ſubject which is independent of the ſyſtem of the diminution of the ſea, and concerning which you are forbid to believe any thing beſides what your ſcripture teaches you.

You injure both me and yourſelf, replied I, in depriving me of that which is certainly the moſt curious in your ſyſtem. I conceive that the truth of your opinion concerning the diminution of the ſea, does not depend on the origin of man; but I am perſuaded that your ſentiments on this ſubject are not leſs ſingular than all I have hitherto heard from you, and you muſt confeſs I

ſhould have reaſon to complain of you, if you left me ignorant of what I cannot learn from any perſon elſe. Let us make the beſt uſe of the ſmall time which remains; you may ſpeak your thoughts with freedom, without any fear of offending me. I already know what ſome philoſophers advance againſt the creation of man by him who created all things. The reaſons on which they found this opinion are ſo frivolous and abſurd, that they only ſerve more and more to confirm a wiſe man in a ſteady belief, that men and animals are the work of God.

You do not do me juſtice, Sir, replied our philoſopher.—It it by no means as you think, a natural conſequence of my opinion on the formation of our Earth, and its coming out of the waters of the ſea, that men and animals have been formed by blind chance, and at random. I know there are abundance of philoſophers both with us and you, who believe all productions, even that of man, to be the effect of a concourſe of atoms, or of a generation proper and natural to matter. Have not the *Egyptians* pretended, that the firſt man was formed in this manner, out of the ſlime of the river *Nile*, warmed by the heat of the ſun? How many other nations have maintained, that the Earth produced men in their own countries? Some have fooliſhly believed, that men and animals were let down from heaven by a chain of gold. This is nearly your ſentiment, ſince you believe them formed upon earth by the hands of God. Others have maintained that they came out of the ſea.

Lucretius as you know, has condemned both theſe opinions, and I agree with him, that men have not deſcended from heaven. But granting matter to be created, if we ſuppoſe alſo the creation of men and animals, by the hand of God, in that ſenſe in which he is the author of their production and their ſpecies, I do not conceive that the ſalt proper to the waters of the ſea, is a reaſon ſufficient to hinder the animals with which the earth is ſtocked, from drawing their origin from theſe, the ſalt of which the earth ſtill includes in her boſom.

In a word, do not herbs, plants, roots, grains, and all of this kind, that the earth produces and nouriſhes, come from the ſea? Is it not at leaſt natural to think ſo, ſince we are certain that all our habitable lands came originally from the ſea? Beſides, in ſmall iſlands far from the continent, which have but appeared a few ages ago at moſt, and where it is manifeſt that never any man had been, we find ſhrubs, herbs, roots, and ſometimes animals. Now you muſt be forced to own, either that theſe productions owed their origin to the ſea, or to a new creation, which is abſurd.

INDEPENDENTLY of these proofs of my sentiment, experience furnishes us with invincible arguments for it. I know you have resided a long time at *Marseilles*; now you can bear me witness, that the fishermen daily find in their nets, and among their fish, plants of a hundred kinds, with their fruits still upon them; and though these fruits are not so large, and so well nourished as those of our earth, yet the species of these plants is in no other respect dubious. They there find clusters of white and black grapes, peach-trees, pear-trees, prune-trees, apple-trees, and all sorts of flowers. When in that city, I saw in the cabinet of a curious gentleman, a prodigious number of these sea productions of different qualities, especially of rose-trees, which had their roses very red when they came out of the sea. I was there presented with a cluster of black sea-grapes. It was at the time of the vintage, and there were two grapes perfectly ripe.

As for the origin of terrestrial animals, I observe that there are none of them, whether walking, flying, or creeping, the similar species of which are not contained in the sea; and the passage of which from one of these elements to another, is not only possible and probable, but even supported by a prodigious number of examples. I speak not only of amphibious animals, serpents, crocodiles, otters, various kinds of sea-calves, and a prodigious number of others, which live equally in the sea and the air, or partly in the water, and partly on the land, but I also speak of those which can only live in the air. You have no doubt read the authors of your own country, who have wrote of the various species of fresh and salt-water fish known at present, the representations of which they have given us in their books. The discovery of *America*, and its seas, has furnished us with a great number of new fish, which are proper to them, as there are others found in the seas of *Europe*, *Africa*, and *Asia*, which are not to be met with elsewhere. We may even say, that among the fish of the same species which are equally caught every where, there is always some difference according to the difference of the seas; whether we have placed under the same class, species which only approach to each other, or whether these fish are really of the same species, only with some difference in their form. Thus the species of sea-fish, which have entered into rivers and flocked them, have undergone some change in their figure, as well as their taste. Thus the sea-carp, perch, and pike, differ from such of their species as are taken in fresh waters.

THE resemblance in figure, and even inclination, observable between certain fish and some land-animals, is highly wor-

thy of our attention; and it is ſurpriſing that no one has laboured to find out the reaſons of this conformity. Without attempting to treat ſo vaſt a ſubject with that care and accuracy it deſerves, permit me, Sir, to make a few obſervations relative to it. We know from the relation of the moſt famous divers of antiquity, of whoſe hiſtories we have preſerved the memory; from the teſtimony of thoſe whom my grandfather employed for eighteen months in examining what paſſes in the bottom of the ſea, and in its boſom, and from our own knowledge, that the animals produced by the ſea are of two kinds; the one being volatile, riſes itſelf from the bottom to the ſurface of the waters, in which it ſwims, walks, and purſues its prey; the other creeps in the bottom, is not ſeparated, except very rarely, from it, and has no diſpoſition to ſwim. Who can doubt, that from the volatile fiſh ſprung our birds, which raiſe themſelves in the air; and that from thoſe which creep in the ſea, aroſe our terreſtrial animals which have neither a diſpoſition to fly, nor the art of raiſing themſelves above the earth?

In order to convince ourſelves, that both have paſſed from a marine to a terreſtrial ſtate, it is ſufficient to examine their figure, their diſpoſitions, their reciprocal inclinations, and to compare them with each other. To begin with the volatile kind, attend, I beſeech you, not only to the form of all our birds, but alſo to the diverſity of their plumage and inclinations, and you will not find one, but you will meet with fiſh in the ſea of the ſame way, have the fins placed in the ſame manner, which ſwim in the water as the birds of their figure fly in the air, which make their courſe ſtraight or round, and their chace, if they are birds of prey, juſt as the fiſh of their form do in the ſea.

You muſt obſerve, Sir, that the paſſage from water into air is much more natural than is generally believed. The air with which the earth is ſurrounded, at leaſt to a conſiderable height, is mixed with a great many particles of water. Water is an air impregnated with a great many parts more courſe, humid, and weighty, than that ſuperior fluid, to which we have given the name of air, though they are in reality the ſame thing.—Thus in a tun full of any liquor, though the inferior part is mixed with coarſer particles, and conſequently is leſs clear and thicker, than the ſuperior; yet it is evident, that a part of the liquor ſtill ſubſiſts in the precipitated lye; and that a part of this lye, in like manner remains mixed with the ſuperior liquor, but in a greater quantity, immediately above the lye, than in the uppermoſt part of the liquor. Thus immediately above the waters, the air is impregnated with more aqueous parts, than at a greater elevation. Thus in a tempeſt, with which the ſea, the lakes, and rivers, are agitated, the air is fuller of the particles of

water than after rains, which reſtore to the ſea, &c. the aqueous particles which the winds had raiſed and mixed with the air. It is thus, in a word, that in certain climates, and at certain ſeaſons, the air with which the earth and the ſea is ſurrounded, is ſo impregnated with aqueous parts, that it ought to be conſidered as an equal mixture of air and water. It is therefore eaſy to conceive, that animals accuſtomed to the water may preſerve life in reſpiring an air of this quality. 'The inferior air, ſays one of your authors, is nothing but an extended water. It is moiſt becauſe it comes from the water; and it is hot, becauſe it is not ſo cold as it may be when it returns into water.' He adds a little lower,——'there are in the ſea, fiſh of almoſt all the figures of land-animals, and even of birds. She includes plants, flowers, and ſome fruits; the nettle, the roſe, the pink, the melon, and the grape, are to be found there.'

Add, Sir, to theſe reflections, the favourable diſpoſitions, which may concur in certain regions for the paſſage of aquatic animals from their abode in the water to that in the air. Conſider even the neceſſity of this paſſage in ſome circumſtances; for example, when the ſea has left them in lakes, whoſe waters are ſo diminiſhed that they have been forced to accuſtom themſelves to live upon land. This may alſo be the effect of ſome of theſe accidents, which are not looked upon as very extraordinary; for it may happen, as it often does, that winged or flying fiſh, either chaſing, or being chaſed, in the ſea, ſtimulated by the deſire of prey, or the fear of death, or puſhed near the ſhore by the billows, have fallen among reeds or herbage, whence it was not poſſible for them to reſume their flight to the ſea, by which means they have contracted a greater facility of flying—Then their fins being no longer bathed in the ſea-water, were ſplit and became warped by their dryneſs. While they found among the reeds and herbage among which they fell, any aliments to ſupport them, the veſſels of their fins being ſeparated were lengthened and clothed with beards, or to ſpeak more juſtly, the membrances which before kept them adherent to each other, were metamorphoſed. The beard formed of theſe warped membrances was lengthened. The ſkin of theſe animals was inſenſibly covered with a down of the ſame colour with the ſkin, and this down gradually increaſed. The little wings they had under their belly, and which like their fins helped them to walk in the ſea, became feet, and ſerved them to walk on land. There were alſo other ſmall changes in their figure. The beak and neck of ſome were lengthened, and thoſe of others ſhortened. The conformity, however, of the firſt figure ſubſiſts in the whole, and it will be always eaſy to know it.

EXAMINE all the ſpecies of fowls, large and ſmall, even thoſe of the *Indies*, thoſe which are tufted or not, thoſe whoſe feathers are reverſed, ſuch as we ſee at *Damiette*, that is to ſay, whoſe plumage runs from the tail to the head, and you will find ſpecies quite ſimilar, ſcaley or without ſcales. All ſpecies of parrots, whoſe plumages are ſo different, the rareſt and the moſt ſingularly marked birds, are conformable to fiſh, painted like them with black, brown, gray, yellow, green, red, violet colour, and thoſe of gold and azure; and all this preciſely in the ſame parts, where the plumages of theſe birds are diverſified in ſo curious a manner. All kinds of eagles, falcons, kites, birds of prey, and in a word, all that we know flying in the air, even the different ſpecies of flies, large and ſmall, with long as well as with ſhort wings, are conformable to ſimilar ſpecies contained in the ſea, and have not only the ſame form and colour, but alſo the ſame inclinations.

THE transformation of a ſilk-worm or a caterpillar into a butterfly, would be a thouſand times more hard to be believed than that of fiſh into birds, if this metamorphoſis was not daily made before our eyes. Are there not ants which become winged at a certain time? What would be more incredible to us than theſe natural prodigies, if experience did not render them familiar to us? How eaſy is it to conceive the change of a winged fiſh flying in the water, ſometimes even in the air, into a bird flying always in the air, in the manner I have explained? The ſeeds of theſe fiſh conveyed into marſhes, may have alſo laid a foundation for this tranſmigration of the ſpecies, from an abode in ſea to that on land. If a hundred thouſand have periſhed in contracting the habitude, yet if two have acquired it, they are ſufficient to give birth to the ſpecies.

WITH reſpect to walking or creeping animals, their paſſage from the water to the land is ſtill more eaſy conceived. There is no difficulty, for inſtance, in believing that ſerpents and reptiles may equally live in either of the elements. Experience does not permit us to doubt of it.

As for quadrupeds, we not only find in the ſea, ſpecies of the ſame figure and inclinations, and in the waves living on the ſame aliments by which they are nouriſhed on land, but we have alſo examples of theſe ſpecies living equally in the air and in the water. Have not the ſea-apes preciſely the ſame figure with thoſe of the land? There are alſo ſeveral ſpecies of them.—Thoſe of the ſouthern are different from thoſe of northern ſeas; and among theſe laſt our authors diſtinguiſh the *Daniſh* ape from the other ſpecies. Do we not find in the ſea a fiſh with two teeth like thoſe of the elephant,

and on its head a trunk with which it draws in the water, and with it the prey neceſſary for its ſubſiſtence? One of theſe was ſhewn at *London* very lately. Would it be abſurd to believe that this ſea-elephant has laid a foundation for the ſpecies of land-elephants?

The lion, the horſe, the ox, the hog, the wolf, the camel, the cat, the goat, the ſheep, have alſo fiſh in the ſea ſimilar to them. In the preceding age, there were ſome ſea-bears ſhewn at *Copenhagen*, which had been ſent to the king of *Denmark*. After having chained them they were permitted to go into the ſea, where they were ſeen to ſport together for ſeveral hours. Examine the figures of the fiſh which are known to us, and you will find in them nearly the form of moſt of our land-animals.

There are twenty kinds of phocas's, or ſea-calves, large and ſmall. Your hiſtories, and the journals of your literati, ſpeak enough of the occaſions, on which they have been taken, and even tamed. The city of *Phocea*, as is ſaid, drew its name from the great number of theſe animals always ſeen in the ſea contigious to it. At *Smyrna*, about twenty-five years ago, one of theſe came to repoſe itſelf every day, for five or ſix weeks ſucceſſively, in a convenient place. She threw herſelf out of the ſea upon ſome planks about two or three feet from the ſhore, where ſhe paſſed ſome hours, ſighing like a perſon in diſtreſs.—This animal ceaſing to appear, came back three days after, with a young one claſped in one of its fore legs. After this, it continued to ſhow itſelf for more than a month, eating and ſucking bread and rice, which were thrown to it.

Much about the ſame time, another ſea-calf appeared in the middle of the harbour of *Conſtantinople*. It threw itſelf out of the ſea into a barge laden with wine, and laid hold of a ſailor who was ſitting on a hogſhead; this wine belonged to M. *de Ferrol* an embaſſador to the port. The calf ſecured the man with one of his fore legs, and plunging with him into the ſea, he came up about thirty paces thence, ſtill holding the man as if he had gloried in his conqueſt, after which he diſappeared.—This animal, ſome of your poets would ſay, was a nymph or a nereid, who falling in love with the ſailor, carried him off in order to conduct him into one of her aquatic palaces. It is highly probable, that facts of this kind, happened in former ages, have given riſe to the hiſtories of your metamorphoſes.

About a hundred years ago, one of the petty *Indian* kings tamed one of theſe phocas's or ſea-oxen; he called it *Guinabo*, from the name of the lake to which it retired, after having eaten its food at the king's palace, to which it went every day,

when called, followed by a crowd of children. This continued nineteen or twenty years, till a *Spaniſh* ſoldier having thrown a dart at it, it no longer came out of the water, while it ſaw on the ſhore men with arms and beards. It was ſo familiar with the children, and at the ſame time ſo large and ſtrong, that one day it carried fourteen of them on its back, from one ſide of the lake to another.

THAT taken at *Nice*, about ſixty years ago, was very different from this: It was not much larger than a common calf, having very ſhort legs, and a large head. It lived ſeveral days without doing any harm, and eating whatever was given it. It died when they were tranſporting it to *Turin*, to ſhew it to the duke of *Savoy*.

THE phocas's are very common in the *Scotch* ſeas: They come to repoſe themſelves on the ſand by the ſea-ſide, and there ſleep ſo ſound, that they do not wake till people are very near them; then they throw themſelves into the ſea, and afterwards riſe out of the water to look at perſons on the ſhore. There are a great many of them on the coaſts of *Hiſpaniola*, they enter into the rivers and feed upon the graſs and herbs on their banks. At *Rome* they were fed with hay, and millet, which they eat ſlowly, and as it were ſucking it.

YOU can eaſily conceive, Sir, that what art can do in phocas's, nature can do the ſame of herſelf; and that on certain occaſions theſe animals, having for ſeveral days lived well out of the water, it is not impoſſible, but they may be accuſtomed to live always ſo, even by the impoſſibility of returning to it.—It is thus certainly that all terreſtrial animals have paſſed from the waters to the reſpiration of the air, and having contracted the faculty of lowing, howling, and making themſelves underſtood, which they had not, or which they had but very imperfectly in the ſea.

DURING the embaſſy of the marquis *de Ferrol*, whom I have mentioned, there was a ſmall ſea-dog about a foot high, taken near *Conſtantinople*, on the brink of the river. His mother, who was higher than a calf, large and thick, had brought him to land. She came with fury to the mariners, who had ſeized her puppy; but ſome balls ſhot at her obliged her to return to the ſea. This puppy, which was carried to the ambaſſador's palace and lived there ſix weeks, could ſcace bark when it was taken, but its voice was ſtronger and louder daily. This ſpecies was, in that reſpect different from that of certain dogs of *Canada*, which continue always dumb; which invincibly proves that they deſcend from ſea-dogs; that of which I ſpeak, was ugly and

fierce; he had ſmall eyes, ſhort ears, and a long and ſharp ſnout; his hair was ſhort, hard, and of a browniſh colour; his tail terminated like that of certain fiſh, and of beavers, in the form of an helm or rudder, in order to direct his courſe in the ſea.

Do they not in the lower *Germany*, feed in ponds of freſh-water, ſea-bears, which may be alſo called ſea-dogs, and which are very common in the ſeas of cold countries? Have not theſe the colour and the hair of *Daniſh* dogs? When I went to *Dantzick*, I ſaw one of them in a pond. At the ſmalleſt noiſe he heard on the brink of the pond, he lifted up his head, to ſee what was the occaſion of it. Is it to be doubted that our dogs have come from theſe ſea-dogs, ſince they reſemble them ſo perfectly in figure, colour, and other circumſtances?

As for man, who ought to be the principal object of our attention, you have, no doubt, read, continued our philoſopher, what your ancient hiſtories relate concerning the tritons or ſea-men; but I ſhall not mention what the ancients have wrote on this ſubject, I ſhall paſs over in ſilence, what *Pliny*, who is perhaps unjuſtly branded as a lyar, has ſaid concerning a tritons who was ſeen in the ſea playing on the flute. His muſic, to be ſure, could not be very delicate and harmonious. I ſhall not ſpeak of that generally received tradition that there are human forms perfect from the middle upwards, and terminating in a fiſh below. This has with you paſſed into a proverb, in order to denote a work whoſe end does not correſpond to its beginning. I ſhall alſo omit the hiſtory of the ſyrens, who by the ſweetneſs of their ſongs, as it is ſaid, only allured men, in order to devour them. In a word, I ſhall reject every thing which may be ſuppoſed to be the effect of fancy and imagination, in the works of the ancient poets, and only adhere to well-atteſted facts, which have happened in or near our own time, and which every one has an opportunity of enquiring into.

I HAVE in your hiſtories read, that in the year 592 of your Æra, on the 18th of *March*, an officer of one of the towns of the *Delta*, or the lower *Egypt*, walking one evening with ſome of his friends on the banks of the *Nile*, perceived pretty near the ſhore, a ſea-man, followed by his female, the male raiſing himſelf oftner above the water, as far as his ſecret parts, and the female only to the navel. The man had a fierce air, and a terrible aſpect, his hair was red, and ſomewhat briſtly, and his ſkin of a browniſh colour. He was like to us in all the parts which were ſeen. On the contrary, the air of the woman's countenance was ſweet and mild, her hair was black, and floating on her ſhoulders, her body white, and her breaſts prominent. Theſe

two monſters remained near two hours in the ſight of this officer, his friends, and thoſe of the neighbourhood, who had come to ſee ſo extraordinary a fact. An atteſtation of it was drawn up, ſigned by the officer and many other witneſſes, and ſent to the emperor *Maurice* who then reigned.

During the ſtay which *Salem* made at *Derbent*, when he was ſent by *Vatec*, calif of the race of *Abaſſides*, to the *Caſpian* ſea, in order to review the fortreſs, which the ancients ſaid was built to hinder the northern nations from making incurſions into *Aſia*, there happened a fact of a ſtill more ſingular and ſurpriſing nature. It was related by *Caſvinia*, a celebrated *Arabian* author, who in his book intiled *Agaub. el Malkloukat*, that is, *the marvellous things found in the Creatures*, places it in the year of the hegyra 288, which correſponds to the year 894, of your Æra. He ſays, that the prince of that country, going one day to fiſh on the *Caſpian* ſea, took *Salem* with him: In the courſe of the diverſion, they took a large fiſh, which was immediately opened, and in whoſe belly was a ſea-girl ſtill alive; ſhe had on a pair of drawers without a ſeam, made of a ſkin like that of a man, and which came down to her knees. This girl ſometimes held her hands on her face, and at others tore out her hair. She fetched deep ſighs, and lived but a few moments after ſhe was taken from the belly of this monſter. *Caſvini* adds, that the *Tarik Magreb*, an *Arabian* hiſtory of *Perſia*, confirms this narration by other facts which he quotes, concerning the ſyrens and the tritons found in the ſea.

The hiſtory of the *Netherlands* alſo relates, that in the year 1430, after a great inundation, which was conſiderably diminiſhed, ſome women of the town of *Edam*, ſituated on the ſea of *Zealand* at the extremity of the little river *Tye* going from their town in a boat to *Prumeraude*, where their cows were feeding, found in their way a ſea-girl half buried in the mud; that they took her up, waſhed her, cleaned her, and took her to *Edam*, where they cloathed her: The hiſtory adds, that they taught this girl to ſpin, and to make the ſign of the croſs, but that they could never teach her to pronounce one word, though they had taken her to *Haerlem*, where ſome literati attempted to make her ſpeak. She was entirely like to our women, except in a very few particulars. She retained a great love for the ſea, and even for the waters of rivers and canals, ſo that they were obliged to watch her leſt ſhe ſhould throw herſelf into them, as ſhe had ſeveral times attempted. But after having ſome years contracted a habitude of reſpiring nothing but air, perhaps ſhe could not have afterwards lived in the element in which ſhe was born.

THE following fact is taken from an account drawn up by *Peter Luce*, captain commander of the quarters of the *Diamant* in *Martinico*, on the thirty-firſt of May, 1671, and given to *Peter de Beville*, notary of the quarters of his company, in the preſence of *P. Julſian* a jeſuit, and three other witneſſes who have ſigned the account, which is alſo corroborated by the ſeparate and conjunct depoſitions of two *Frenchmen*, and four negroes. This account teſtifies, that on the twenty-third of *May* theſe *Frenchmen* and negroes, having gone in a boat to the iſlands of the *Diamant*, in order to fiſh, and returning about ſun-ſet, they ſaw near the ſhore of an iſland where they were, a ſea-monſter of a human form from the middle upwards, and terminating below like a fiſh. His tail was large and ſplit, like that of a *Carangue*, a fiſh very common in that ſea. His head was of the bulk and form of that of an ordinary man, with ſtraight black hair intermixed with gray, hanging over his ſhoulders.—His countenance was large and full, his noſe big and flat, his eyes of the uſual form, and his ears large; his beard, which like the hair of his head was mixed with gray hairs, was ſeven or eight inches long, his ſtomach was covered with hair of the ſame colour; his arms and hands were like ours, and when he appeared above water, he ſeemed to wipe his face with them ſeveral times, and on his coming up ſnorted as dogs do when they come up after being plunged in water; his body, which was raiſed above the water as far as his middle, was ſlender like that of a young man of fifteen or ſixteen years of age; his ſkin was moderately white, and the length of the whole body ſeemed to be about five feet; his air was fierce, and he looked at them all one after another with great attention, without appearing to be aſtoniſhed. When they firſt ſaw him he was not above ſeven paces from the rock on which they were. He plunged ſometime after, and came up only about four paces from them. Diving again, he came up about three feet from them, and was ſo near that one of the company preſented his line to him, in order to ſee if he could catch him; then he made off towards the *Savanna* contiguous to the iſland where they were, and plunging a third time diſappeared.

THE deſcription of this ſea-man, agrees with that which I have before related, except in this, that the man and woman ſeen in the *Nile*, were at ſo great a diſtance that the ſpectators could not diſtinguiſh the inferior figure of their bodies, which was under the water. That taken at *Seſtri* in the ſtate of *Genes*, appeared alſo in the ſea to be terminated like a fiſh, and to have his tail divided like that taken at *Martinico*. He was, however, a man from his middle downwards as well as upwards. It is eaſy to perceive the reaſon of the error which our eyes fall into,

when we view a man in an upright poſition in the ſea. It is ſufficient for this to reflect, that in order to keep ourſelves upright and elevated above the waters, we muſt keep our thighs and legs cloſe, and move our feet up and down, which to the ſight produces in the inferior part of a man, the figure of a fiſh, and of a tail divided by the ſeparation of the extremity of one of the feet from the other. On the contrary, a man who ſwims flat on the water ſwims naturally like a frog, ſeparating his thighs and uniting them, in order to act the more ſtrongly on the water, with the ſoals of his feet.

This ſea man taken at *Seſtri* in 1682, was ſeen by all the inhabitants of that ſmall city. He in every reſpect reſembled that taken at *Martinico*, except that inſtead of hair and a beard, he had a kind of moſs on his head, about an inch long, and a little very ſhort down on his chin. In the day-time he was placed on a chair, where he ſat very calmly for ſome time; which evidently proves, that his body was flexible, and that he had joints, which fiſh have not. He lived thus for ſome days, weeping and uttering lamentable cries, but would take nothing either to eat or drink. I got this account twenty-five years ago at *Seſtri*, where I found a lady of my acquaintance, of great wit and curioſity, and who, as well as I, informed herſelf of theſe particulars.

Such alſo was the form of another ſea-man who was killed in the night-time by a muſket-ſhot, in the ditch at the foot of the walls of *Boulogne*, where the reflux of the ſea had left him, and from whence he attempted to get out. The centinel taking him for an ordinary man who refuſed to ſpeak, ſhot him. Mr. *Maſon* has given a deſcription of him in the book he has compoſed concerning the fiſh and ſhell-fiſh of that coaſt, printed at *Paris*. This difference of hair and beard among ſea-men, proves that both of thoſe of the human race, who have long hair, ſuch as the whites, and thoſe who have on their head and chin a kind of wool, as the blacks, equally derive their origin from the ſea.

I shall add a fact well known at *Martinico*, and poſterior by more than thirty years to that in 1671, which I have related. Mr. *Larcher*, an inhabitant of the place, returning one day to Fort Royal, from a houſe he had at the three iſles, being in his canoe, armed with eight negroes, and having his head turned from the negroes, theſe cryed out all at once, a white man in the ſea. Upon this Mr. *Larcher* turning his head towards them, only perceived the bubbling of the water in the part where the monſter had diſappeared. The eight negroes ſeparately atteſted, that they had ſeen a man, ſuch as the whites, raiſed

above the water, and attentively looking at them. They added, that he plunged into the ſea, the moment they cryed out, a white man.

THESE examples then are not ſo rare as people are apt to imagine; and if ſuch ſea-men are found in the moſt frequented ſeas, is it not probable that they muſt be found in greater abundance, in thoſe contiguous to deſert coaſts?

WE read in the hiſtory of Portugal, and in the account of the Eaſt-Indies, that ſome people having on the Indian coaſt one day caught a conſiderable number of tritons, or ſea-men and women, they could bring none of them to Don Emanuel, who then reigned, except one woman and her daughter, all the reſt having died, either ſoon after they were taken out of the water, or in their paſſage from the Indies to Liſbon. This woman and her daughter were ſo extremely melancholy, that nothing could comfort them, and they eat ſo very little, they ſenſibly decayed. The king touched with their condition, and perhaps prompted by curioſity, ordered, that after having chained them that they might not eſcape, they ſhould be put into ſome ſhallow part of the ſea. They ruſhed into it eagerly, and having plunged themſelves, they ſported together, and in the water, where they were diſtinctly ſeen, performed a thouſand tricks which teſtified their ſatisfaction and their joy. They remained three hours under water, without coming above its ſurface to reſpire. From that day, when the king and all his court had the pleaſure to be witneſſes of ſo new a ſpectacle, they continued every day to lead them to the ſame place, and permit them to enjoy the ſame pleaſure, by means of which they lived ſome years; but they could never learn to articulate a ſingle word.

THE fact I am now to relate to you is of another kind, and much more ſingular. Towards the end of the laſt age, an Engliſh veſſel belonging to the city of Hull, ſituated one hundred and fifty miles from *London*, on the north coaſt of *England*, when fiſhing for whale in the ſeas of Greenland, a hundred and fifty leagues from land, was ſurrounded about noon by ſixty or eighty ſmall boats, in each of which there was a man. The ſailors had no ſooner diſcovered them, than they put out their ſhip's boats, in order to come up with ſome of them: But the men in the ſmall boats, which they conducted with two ſmall oars, perceiving this, and ſeeing that the ſhip's boats gained ground of them, plunged all at once into the ſea, with their boats, and none of them appeared the whole day after except one.—This returned to the ſurface of the water, a minute after, becauſe, by plunging, one of the oars was broken. After four hours chace, and a hundred new plunges, in proportion as the ſhip's

boats approached, the little boat was at laſt taken, together with the man that was in her. He was brought on board the ſhip, where he lived twenty days, without ever taking any nouriſhment, or uttering any cry or ſound which could make people ſuſpect that he had the uſe of ſpeech; but he ſighed continually, and the tears flowed from his eyes. He was ſhaped like us, with a beard and hair pretty long. but from the middle downward, his body was all covered with ſcales.

As for the boat, it was eight or nine feet long, and was very narrow, eſpecially at the two extremities. The ribs of it, and even the ſeat on which he ſat, were fiſh-bones. It was covered within and without, with the ſkins of the ſea-dog ſtitched to each other. This boat had in the middle an opening large enough to let the rower in, and the aperture was ſurrounded by a kind of ſack or purſe of the ſame ſkin, with which the man introduced to the middle into the boat girt himſelf ſo perfectly with bands alſo made of the ſame ſkin, that the water could not enter into the boat. Before the man were two pieces of the ſame ſkin fixed to the covering, where they formed two kinds of pouches. In the one were found lines and hooks alſo made of fiſh-bones, and in the other ſome fiſh, which appeared to have been but lately taken. At the rower's ſides were two ſmall oars, alſo fixed to the boat by ſtraps of the ſea-dog's ſkin. All theſe curioſities, together with the man himſelf dried, are ſtill to be ſeen in the town-hall of *Hull*; and the account itſelf atteſted by the captain and all the crew, is to be found in the archives of that place.

The conſequences of a fact ſo ſingular, and ſo authenticated, are ſuch ſtrong proofs of the poſſibility of the human race coming out of the ſea, that it even ſeems impoſſible, after what has been ſaid, to doubt of it. In a word, except in point of reaſon, of which we are not here ſpeaking, the men belonging to theſe little boats, were men, ſuch as we are, dumb indeed, but capable of living in the ſea as well as in the air, ſince during the whole day, there only appeared one on the ſurface of the water. They certainly drank the water of the ſea, ſince there was no freſh water in the boat which was taken, and ſince they were an hundred and fifty leagues from land, on which they muſt have certainly built their boats, and found the wood for making their oars. They muſt therefore have known how to return into theſe places, whether they had this knowledge from the diſpoſition of the ſtars and ſun, or from the bottom of the ſea, under which they could walk and reſt by means of their oars. It was alſo neceſſary, that they ſhould refit their ſmall boats in the places where they had built them, and where, perhaps, they had their wives and children. All theſe are circumſtances worthy of ſingular attention, and of the moſt profound reflection.

Father *Henriquez*, a *Jeſuit*, relates, in one of his letters printed at *Venice* in 1548, and 1552, that being in the *Eaſt-Indies*, near the *Indian* point, he was one day invited to ſee ſixteen tritons, ſeven male and nine female, which they had taken at one hawl of the net. I was aſſured, that in the Texel, about thirty years ago, there was a ſea-man taken, who lived three days, and was ſeen by all the people of Amſterdam.—They who fail in the Greenland ſeas affirm, that on the coaſt of that country they often meet with thoſe figures male and female, but of a larger ſize than thoſe in the other ſeas. A thouſand ſimilar examples found in your books, eſpecially in your voyages, evince that theſe monſters, are frequently ſeen by ſhip's crews, during the courſe of their navigation, even ſo near, that it is often eaſy to view them and their ſhapes perfectly.

The following is a proof of what I have advanced, ſo recent, ſo circumſtantiate, and ſo authentic, that we muſt renounce our reaſon, and bid adieu to all evidence, if we do not yield to it. In 1720, on Thurſday the 8th of Auguſt, the wind variable, being eaſt ſouth-eaſt, in twenty-eight or thirty fathoms of water, ſeven ſhips in view on the banks of Newfoundland, about ten o'clock in the morning, there appeared near a French veſſel called the Mary de Grace, commanded by Oliver Morin, a ſea-man, who firſt ſhewed himſelf under the roundlet of the owner, whoſe name was William L'Aumone. The owner forthwith took a gaff in order to draw him on board. But the captain hindered him, for fear the monſter ſhould drag him along. For this reaſon he only gave him a blow on the back with it, without piercing him.

When the monſter felt the blow he turned his face to the owner like a man in wrath, who wanted to make repriſals. He ſwam round the ſhip, and when he was behind her laid hold of the rudder with both hands, which obliged the crew to fix its handle to both ſides of the ſhip, leſt he ſhould endanger her.—Then he repaſſed by the ſtarboard, ſwimming always as if he had been an ordinary man, and when he was before the veſſel, he ſtopped to look at the figure on the bow, which was that of a beautiful woman. After having long conſidered it he laid hold of the loweſt rope of the bowſprit, and raiſed himſelf out of the water with a ſeeming intention to ſeize the figure. They tied a caſk to a rope, and allowing it to hang at the ſide of the ſhip, he took it and handled it without breaking it.

He afterwards ſwam to the windward of the ſhip, about a cable's length, and paſſing behind her, again laid hold of the rudder. The captain having ordered a harpoon to be prepared, tried to harpoon him, but miſt his blow. The handle only ſtruck

his back, upon which he for a long time turned his face to the captain, as he had to the owner, and with the same gestures.—After this he passed before the ship, and again stopped to consider the figure, upon which the owner ordered the harpoon to be brought to him: But being afraid lest this sea-man had been the ghost of a sailor called Commune, who the year before had made away with himself on board the ship, the 8th of the same month, which was August, his trembling hand ill directed the blow, so that for a third time the monster was only struck with the baton, to which the harpoon was fixed. Then he presented his countenance with a menacing air, as he had done the two former times. This, however, did not hinder him to come nearer, and to lay hold of a line with which one John Marie was fishing. After this he again swam to the windward of the ship, to the distance of a gunshot.

He afterwards returned, came very near, and raised himself out of the water as far as his navel, so that all the company distinctly observed, that he had a breast as full as that of a woman. Then he turned himself on his back, and with his hands laid hold of his private parts, which were as large as those of a horse. After this he swam round the ship, and again laid hold of the rudder. Swimming from thence slowly, he raised himself out of the water, and turning his back towards the ship, he voided his excrements against her side. After this he moved off till we could see him no longer.

This entertainment lasted from ten o'clock in the morning till noon, the monster having all that time been near the vessel, and often not above two or three feet distant, so that the crew, composed of thirty-two men, had both the pleasure and convenience of remarking the following particulars; that his skin was brown and tanned, but without scales; that all the motions of his body, from head to foot, were like those of a real man; that his eyes were well proportioned; that his mouth was of a moderate size, considering the length of his body, which by the crew was computed to be about eight feet; that his nose was large and very flat, his tongue thick, his teeth large and white, his hair black and straight, his chin furnished with a downy beard, and moustaches of the same kind under his nose, his ears like those of an ordinary man, his feet and hands the same, except that his fingers were joined with a pellicule, such as that found in the feet of geese and ducks. In a word, his body was as well shaped as that of an ordinary man.

This detail is taken from an account drawn up by John Martin pilot of the vessel, signed by the captain and all those of the crew who could write, and sent from Brest by Mr. Hau-

tefort, to the count de Maurepas, on the 8th of September, 1725.

In 1731, about two leagues from Nice, there was a large fiſh found, in the belly of which there was a hand like that of a man, ſeparated from the arm, as if it had been cut by a hatchet. This hand was ſo ſound, that by the ſmall impreſſion the digeſtion of the animal had made upon it, it was eaſy to ſee, that it was but very lately ſwallowed. It was ſeen by a prodigious number of people, and among the reſt by Mr. L'Honore procurator of the court of Turin, from whom I had this relation, as well as from a fiſherman who was preſent at the opening of this fiſh. The fingers of the hand, entirely like thoſe of a man, were united by a pellicule like that in the feet of geeſe and ducks; a certain proof that it could be no other than the hand of a ſea-man, which the fiſh had juſt bit off, without being able to ſwallow the whole man, or a more conſiderable part of his body.

Perhaps, Sir, you will ſay, that theſe facts tend to prove, that there are different ſpecies of men; for my own ſhare, I think it impoſſible to doubt of it, after all theſe teſtimonies. Is it not ſufficiently known, that in the iſland of Madagaſcar there is a kind of wild or ſavage-men ſtill dumb, and ſo ſwift runners, that it is almoſt impoſſible to come up to them, or take them?

A short time ago, two veſſels coming from your coaſts, in order to purchaſe blacks at Senegal, one of them was ſeparated from her convoy by a tempeſt, and for want of freſh water put in to a land little frequented. The king of the country made a preſent to the captain of an animal all covered with hair, which he put on board, believing it to be an ape of an extraordinary figure. The veſſel ſet ſail, and was afterwards expoſed to ſo many tempeſts, that the ſailors, who are generally ſuperſtitious, imagined that ſuch bad weather proceeded from the ſtrange animal they had on board. They begged that it might be thrown into the ſea; and the captain, who would have gladly preſerved it, was obliged to ſatisfy them. Some time after arriving at a port not far from the former, he underſtood with aſtoniſhment and regret, that what was taken for an ape, was a man of a particular ſpecies, who inhabited the mountains of the country where he had been embarked.

Nothing is more common than thoſe ſavage-men; in 1702, the Dutch Eaſt-India company ſent out two veſſel from Batavia, for the coaſts of New Guinea, and the ſouthern countries, in order to trade and make diſcoveries. During that expedition, which was of no uſe, the Dutch ſeized two male animals, which

they brought to Batavia, and which, in the language of the country where they were taken, they called Orang-outangs, that is, men who live in the woods. They had the whole of the human form, and like us walked upon two legs. Their legs and arms were very ſmall, and thick-covered with hair, ſome of which they alſo had on the whole of their body, their faces not excepted. Their feet were flat, where they are joined to the leg, ſo that they reſembled a piece of plank with a baton driven into it. Theſe Orang-outangs had the nails of their fingers and toes very long, and ſomewhat crooked. They could only articulate ſounds very indiſtinctly, but were very melancholy, gentle, and peaceable. The one died at Batavia, and the other in the road to Holland, whither he was ſent as a curioſity worthy the admiration of all Europe. In a word; if we could not ſay, that theſe living creatures were men, yet they reſembled them ſo much, that it would have been raſhneſs to pronounce that they were only brutes.

To return to the different ſpecies of men. Can thoſe who have tails, be the ſons of them who have none? As apes with tails do not certainly deſcend from thoſe which have none, is it not only natural to think, that men born with tails are of a different ſpecies from thoſe who have never had any? They are alſo characteriſed by very different qualities. I know that a great many people are perſuaded, either that there are no men with tails, or that if there are, it is an error of nature, or an effect of the mother's imagination: But they who think in this manner, are certainly deceived in ſuppoſing, that ſuch men and women either do not exiſt at all, or are very rare. It is true the ſhame and turpitude attached to this deformity, the fierce character, and the little ſenſe of all thoſe ſubject to it, and their natural hairyneſs, oblige them to conceal their misfortune from the perſons among whom they live. They take the ſame care of their children, and theſe inſtructed by their parents uſe the ſame precautions with reſpect to their poſterity. Beſides, it is evident, that this race of men with tails, is much more numerous than we imagine, and that the expreſſion ſo common among you *(homines caudati)* men with tails, in order to denote people of little ſenſe, is by no means metaphorical, but founded on truth. There are a great many of theſe men in *Ethiopia*, *Egypt*, the *Indies*, *England*, and eſpecially *Scotland*, according to all your relations. Some of them are alſo found in *France*, where I have ſeen ſeveral of them. But I ſhall only relate ſome recent inſtances of this kind, of the truth of which you may have an opportunity of being convinced.

Mr. Cruvillier, who with no leſs courage than ſucceſs made an expedition againſt the *Turks*, and who died in *Carmania*

in a ſhip which one of the officers, in order to be revenged of his captain, blew up, was equally remarkable for the tail with which he was born, as for his valiant actions. He was only a clerk of a merchant-ſhip, when one day that ſhip mooring in the port of *Alexandria*, a baſhaw, who was going to *Cairo*, having heard of the exploits of this young man, propoſed to him to wreſtle with a black, whom he had in his ſervice, and promiſed him thirty ſequins if he came off victorious. The black had killed fifteen or ſixteen men in this exerciſe. Though Mr. *Cruvillier* was informed of this, yet he accepted the propoſal of the baſhaw, and came to the place appointed without any preparation. The black, on the contrary, came naked, and his body rubbed with oil, after the cuſtom of the ancient wreſtlers, having only a ſmall bit of cloth to cover his nakedneſs. They, at firſt, viewed each other for ſome time, without engaging. At laſt, after ſome feints, the black ſuddenly ruſhed upon Mr. *Cruvillier*, with a reſolution to ſeize him: But Mr. *Cruvillier*, who had ſtretched out his arms to prevent him, beat the black ſo in the ſides, that they reſiſted his fiſts no more than if they had been butter. By this means he deprived him of reſpiration and ſtrength, and taking his neck between his hands, totally ſuffocated him; then lifting him off the ground, he threw him upon his head with ſuch force, that the whole head was plunged in the ſand. The baſhaw, witneſs (together with all the people and ſtrangers at *Alexandria*) of ſo extraordinary a ſtrength, though touched with the loſs of his black, ordered Mr. *Cruvillier* the thirty ſequins which he had promiſed him. *Cruvillier* when on a cruiſe, and about to engage, left to his crew the choice, either of weighing the anchors while he hoiſted the ſails, or of hoiſting the ſails while he weighed the anchors. He had a brother of equal ſtrength, who reſiding at *Tripoli* in *Barbary*, was by the *Turks* obliged to turn *Mahometan*.—It is ſaid, that he alſo had a tail.

When I went to *Tripoli* ſome time ago, I ſaw a black called *Mahammed*, of an extraordinary ſtrength. By the help of two oars he alone rowed a large ſloop, with greater ſwiftneſs than twenty ordinary men could have done. With one hand he could throw down two or three men at once, and could carry burdens of an aſtoniſhing weight. He was covered with hair, contrary to what is uſual among the blacks, and had a tail half a foot long, which he ſhewed me. I enquired into his country, which he told me was that of *Borneo*. He aſſured me that his father had a tail like his, as well as moſt of the men and women of his country, who go naked, and among whom this tail has nothing diſhonorable, as in *Europe*. The merchants of *Tripoli*, who deal in black ſlaves, alſo aſſured me, that thoſe of that country were

more fierce, ſtrong, and hard to be ſubdued, than thoſe of any other part; that they had almoſt all tails, women as well as men; that many of them paſſed through their hands; that they ſold them well on the coaſts of *Caramania*, where they were employed in cutting wood.

It is by no means ſhameful for a naturaliſt to dive into facts, which may inſtruct him in the ſecrets of nature, and conduct him to the knowledge of certain truths. Being at *Piſa* in 1710, I was informed that there was a courteſan, who boaſted of having known a ſtranger who had been there three years before, and who was one of the ſpecies of men with tails. This inſpired me with a curioſity to ſee her, and examine her with reſpect to the fact. She was at that time no more that eighteen years of age, and was very beautiful. She told me, that in returning from *Liburnia* to *Piſa*, in a paſſage-boat, in 1702, ſhe met with three *French* officers, one of whom fell in love with her.—Her gallant was large, well-made, and about thirty-five years of age; he was of a very fair complexion, his beard was black and thick, and his eye-brows were long and ſhaggy. He lay all night with her, and came very near that labour for which *Hercules* is no leſs famous in fable than for his other exploits. He was ſo ſhaggy that bears themſelves are hardly more ſo. The hair with which he was covered, was very near half a foot long. As the courteſan had never met with a man of this kind, curioſity led her to handle him all over, and putting her hand to his buttocks ſhe felt a tail as large as ones finger, and half a foot long, and ſhaggy as the reſt of the body, upon which ſhe aſked him what it was. He replyed with a harſh and angry tone, that it was a piece of fleſh he had had from his infancy, in conſequence of his mother's longing for a tail of mutton when ſhe was big with him. From that moment the courteſan obſerved, that he no more teſtified the ſame affection for her; the ſmell of his ſweat was ſo ſtrong and particular, and ſmelt, as ſhe ſaid, ſo much of the ſavage, that ſhe could not get quit of it for a month afterwards.

A person of your country aſſured me, that the deceaſed Mr. *Barſabas*, and his ſiſter a nun, both remarkable for particular features expreſſive of ſtrength, had each of them a tail.—When paſſing through *Orleans*, I ſaw a man who had one, and who was alſo very ſtrong and ſhaggy. I have been ſince informed, that wanting to have this tail cut off, he died under the operation, as we are informed in the mercury for the month of September 1718. At *Aix* in the ſtreet called the *Courtiſſade*, there is a poor woman called *Louiſa Martin*, who when thirty-five years of age was ſeized with a contagious diſeaſe, which ranged in that city; the people who had the charge of her in her illneſs,

diſcovered that ſhe had a tail, and ſhewed it to ſeveral perſons, ſo that the ſtory became public. This woman has a ſtrong beard with black hair and eye-brows, is poſſeſſed of an extraordinary ſtrength, and carries on her ſhoulders two large ſacks of corn with as much eaſe as moſt other people carry a faggot. One day ſhe gave a man ſo ſevere a blow, that he fell flat on the ground, and remained half an hour in a fainting fit. There is now at Aix, one Mr. Berard a procurator, called Hog's-Tail, becauſe he was ſeen to have a tail when bathing himſelf, neither does he deny it. He is not of a ſtrong complexion like the woman I have now mentioned, but his face is full of freckles.

To theſe facts, which all the curious may enquire into, I might add a great many others in diſtant countries; but I hope theſe are ſufficient to perſuade you, that the men with tails found now and then, are not born with theſe tails by an effect of chance, or the force of the mother's imagination. They are probably men of a ſpecies as different from ours, as the ſpecies of apes with tails is different from that without them. The ferocity of theſe men, their extraordinary ſtrength, their hairyneſs, and the communication of theſe tails from parents to children, ſeem to be certain proofs of a different ſpecies. If this extraordinary ferocity and hairyneſs are not always equal in all the perſons of this kind, it proceeds from this, that their ſpecies mixed with ours, no doubt loſes ſome of its properties; and that ſome are preſerved in a perſon produced from this mixture, while the others are weakened or concealed for a time. Thus a ſon begot by a father who has tail, and born of a mother who has none, may be without a tail, and this ſon may by a wife without a tail beget a ſon like his grandfather; he may be ſhaggy without having a tail, or he may have a tail without being ſhaggy.

One of your authors pretends, that in the ſouthern part of the iſland of Formoſa, there are whole races with tails; ſuch as thoſe of Africa, mentioned to me by the merchants of Tripoli. Another aſſures us, that he has found whole nations with tails, in the Molucca and Philippine iſlands. This is certain, becauſe as I have told you, notwithſtanding the mixture of their race with ours, it is always perpetuated, ſometimes remaining ſuch as it was in its origin, and ſometimes partaking of both; and after having become ſpurious, it may again reſume the whole force of its eſſence, if a perſon produced by this mixture, finds another in the ſame caſe. This is one of the cauſes of the diverſity obſervable in the conſtitution of theſe men.

Indians of America, and eſpecially thoſe of Canada, except the Eſquines, have neither beards nor hair on any part of

their body. If we tranſport the Braſilians into Portugal, and the *Natives* of *Canada* into *France* or *England*, they and their poſterity will always remain without beards and hair. On the contrary, the *Portugueſe* children when they have lived for two hundred years in *Braſil*, and the *French* children eſtabliſhed in *Canada* equally long, have as much hair on their heads, and as long beards as their anceſtors. Do the men who are born without beards and hair, in cold and hot climates, proceed from the bearded race of men in the ſame countries? Do the black and white moors of *Africa*, and the northern countries, ſo different from ordinary men by their features, and by the wool with which their heads are covered inſtead of hair, deſcend from men who have an air, a ſtature, and hair ſo different from theirs? At Cairo are ſold blacks of a certain canton of Africa, whoſe Penis in erection is crooked from the middle to the extremity.— Do theſe men proceed from the other blacks, in whom no ſuch ſingularity is obſervable? There is another race of blacks, the outermoſt parts of whoſe eyes are rediſh, whereas ours are white, and this ſpecies are of ſo bad natural diſpoſitions, that no body will purchaſe them. There are ſome blacks whoſe legs and arms are no bigger than ſpindles.

I HAVE already mentioned the Eſquines. who of all the nations of Canada, are the only people who have hair and beards. About two or three years ago, theſe people made an incurſion towards the Fort of Pontchartraine, on which occaſion two of their men and two of their girls were taken priſoners. Theſe laſt, one of whom was about ſixteen, and the other fourteen years of age, were conducted to the fort, and lodged in the houſe of the commander's mother, from whom I have this account. The youngeſt of theſe girls died, and the other having a fine genius, ſoon learned the French language, and remained two years in the fort. One day viewing the ſailors who arrive in that road for the ſake of fiſhing, this young ſavage aſked her miſtreſs, why in that nation, there were not men with one leg, as among the Eſquines. The lady anſwered her, that there were men in France as well as elſewhere, who had loſt one of their legs, but that theſe men were no longer fit for the purpoſes of navigation. Theſe, replied the young ſavage, are not the men I mean; there are alſo ſuch among us; but I ſpeak of a race of people, the men and women of which have but one leg and one hand, ſhaped in a very extraordinary manner. Theſe men are very numerous, never ſmile, and can only walk by a kind of jumping or leaping. They are employed in raiſing our boats when they ſink, and in taking up what falls into the ſea, on theſe occaſions. They ſpeak, reaſon, and act like the other Eſquines. In vain did her miſtreſs endeavour to make her vary from this declaration, by pretending that the thing was impoſſi-

ble. This girl, who never contradicted herself, at twenty different examinations, asserted that there was great numbers of such men and women, and that there was even a whole nation of them.

I could relate twenty other particulars, which seem to prove that there are different species of men: But I shall ask you in general, whether you believe, that the black men are descended from the white; and why in the former rather than the latter, there should be, immediately below the epidermis, a fine membrane, which is thought to be the cause of their blackness? In a word, this coat blunts and absorbs the rays of light; whereas, on the contrary, a leaf of quicksilver applied to the back of a glass, reverberates and reflects them. Mahomet was so struck with the difference of the species of black and white men, that he did not hesitate to assert that God had made the one of black and the other of white earth. He could not imagine, that men so different, not only in colour, but also in shape and inclination, could have the same origin. He observes in another place, that though there have been prophets of all other nations, yet there have never been any among the blacks, which denotes that they have so little sense, that the gift of fore-knowledge, the effect of a natural wisdom, which has, in some, been honored by the name of prophecy, has never been the portion of any of the blacks.

There are, in my opinion, still more remarkable differences among the several races of men which we know; for besides these I have mentioned to you, do you imagine that the giants proceed from the same origin with us? About fifty years ago, six leagues from Salonica, in a tomb built of large stones at the foot of a small hill near a town called Katikioi, the body of a man forty-five cubits long was found. Upon the report of this news, Mr. Dusquenet, then French consul in that city, sent people, and Janisaries, furnished him by Cara-Ailam-Ismael-Pacha, commander of Salonica, to take up the bones of that giant. Such of them as were found, were sent in two large boxes to Paris, where the greatest part of them still remain in the king's library. The head was carried to Salonica, and hung up on the top of a public gate, in order to perpetuate the memory of this prodigy. But the injuries of time having rotted it, its great weight made it fall some years ago, when it was unfortunately broken. The Cranium was so large, that before it was hung up, it contained seven quinlots of the corn of that country, which weighed seventeen hundred French pounds. One of the fore teeth, and another of the jaw-teeth having been weighed, the former was found to weigh a hundred and forty, and the other four hundred and twenty drams; that is, the one was about a

pound and an half, and the other about four pounds in weight. One of the men ſent by the conſul, to raiſe the bones of this giant, was ſtill alive, when I paſſed through Salonica, and obligingly recounted theſe particularities to me.

THERE have been alſo giants in France. Not longer than five hundred years ago there was in Dauphine, one eighteen feet high, whoſe tomb, bones, and figure are drawn on the walls of the church in which he was buried. During this laſt age a man between eight and ten feet high, was ſhewn publicly at Paris; and in America a whole nation of giants are lately diſcovered, of whom I have got the following account.

FOUR ſavages of the village of Sejou in Canada, having gone, according to the Canadian cuſtom, to take a priſoner, in ſtead of one of their own who had been aſſaſſinated, took their road towards the weſt, and croſſed ſeveral countries, the people of which were ſometimes their enemies. They avoided them, and went farther, in order to execute this reſolution, which among them is looked upon as a piece of generoſity and bravery. They travelled in this manner for ten months, till they came to a country where the men were ten or twelve feet high. Pleaſed to find theſe giants, they propoſed to bind one of them and carry him off with them. With this deſign they concealed themſelves in the thickets adjacent to one of their habitations, where they remained three days. During that time they ſaw ſeveral paſs and repaſs, but durſt not attack them, becauſe they were in companies. At the end of that time they ſaw one alone, at whom they all ſhot their arrows at once. The giant being wounded fell on the ground, and as his wounds were too conſiderable to admit of carrying him off, they cut off his head, and carried it to their own country, after being about eighteen months abſent. This head, with the hair which they had torn off from it, was ſeen by Mr. Pachot, a French officer, then in theſe quarters, with a detachment of the colony of Canada. According to his relation, this head was at leaſt as large as three ordinary heads.

THERE has lately been ſhewn at London the hand of a ſea-giant killed near Virginia, by a cannon-ball, and having with him another ſmaller giant, who was, no doubt, one of his children. This hand was four feet from the wriſt to the extremity of the fingers. It was ſo perfectly like our hands, with lines, nails and fingers, ſo ſimilar, that it was not poſſible to doubt of its being a human hand. Several ſurgeons thought it artificial; but, upon probing it they were undeceived. I have this fact from my lord Baltimore's brother, who aſſures me that he has ſeen and touched this hand, as well as the ſea-elephant ſhewn at the ſame time in London. The giants are not therefore a race

of imaginary mortals, ſince there have been, and ſtill are ſuch men. I have ſeen a book intituled, *the Univerſal Hiſtory of the* Eaſt-Indies, wrote by Witfliet in Latin, tranſlated into French, and in 1707 printed at Doway. The author there relates, that in 1722, Magellan being near the ſtraits called by his name, ordered ſeveral ſoldiers and ſailors to deſcend to the port, ſince called the port of St. Julian. Theſe having entered pretty far into the country, found a houſe ſeparated into two apartments. In the one were three men ten feet high, and in the other their wives and children. By ſome ſtratagem they got one of theſe men on ſhip-board, but the other two made their eſcape. This giant had a throat ſo wide, that he could put an arrow a foot and an half long down it. He was ſo ſtrong, that no fewer than eight men could tie him. He eat a baſket full of biſcuits, and drank a gallon of wine. This land was called the land of giants or patagons, and ſtill retains the ſame name. The people of Magellan found, that the coaſts on both ſides of the ſtreights were inhabited by a gigantic race of men.

Now, do theſe giants of paſt or preſent times, deſcend, in your opinion, from the ſame fathers with our race of five or ſix feet high, or that of two feet and an half? That of the giants and ours are, perhaps, intermixed; and the giants of the laſt ages are the remains of the ſpurious ſeed of the firſt. Thus the ſpecies is ſtill renewed on particular occaſions, and preſents us with diminutives, of the original race, which no longer ſubſiſt without a mixture in Aſia and Europe, becauſe our ſpecies be; more ſubtil, dexterous, and without doubt more numerous than theirs, have almoſt deſtroyed them. Does the race of dwarfs about three feet high, ſuch as thoſe of Lapland, and the Eſquines in Canada, deſcend from a race about five or ſix feet high? or can this ſmallneſs of ſtature be aſcribed to the country of which they are natives? But as the dwarfs of Lapland, and among the Eſquines, are ſurrounded by people of an ordinary height, who live in the ſame climates, is it not probable that they have a different origin? In 1698, there died at London a little man brought from Dangola, on the coaſt of Africa. The literati of London had taught him to pronounce ſome words; he walked ſometimes on his feet, but more frequently on his feet and hands like a beaſt. His head and back were preciſely like thoſe of another man. but the other parts of his body, were not ſo fully ſimilar to thoſe of man. Some years ago there were two dwarfs no more than three feet high, ſhewn in boxes at Paris. Their heads were very large, and their voices very rough. They had no teeth, and their bodies were ſquare.

Mr. David Vanderboete, a philoſopher of the laſt age, whoſe meditations on the principles of natural things, wrote in

latin, were publiſhed at Hamburgh in 1678, pretends, that the generation of dwarfs and giants only proceeds from a difference of the humours; that theſe being more or leſs denſe, change the determination, or the rectilinear motion of the acid and volatile ſulphur of the ſeed, which contains the repreſentations of the ſpecies, by diffuſing them for giants, and contracting them for pigmies. This ſyſtem might be defenſible, if we were only treating of rare and ſingular caſes; but as there are whole nations of giants and pigmies, this ſentiment cannot be maintained.—Beſides, I muſt confeſs to you, that I do not thoroughly underſtand what the author means by humours more or leſs denſe, and changing the determination, or rectilinear motion of the ſulphur.

As for my own ſhare, if I was not afraid of depreciating men too much, I ſhould compare the different ſpecies of them to theſe of the brute creation. How many ſpecies are there of apes, oxen, and goats, in the parts of the world known to us? How many ſpecies of dogs are there? How great is the difference between a ſmall Boulogne dog, and a maſtiff of England or St. Malo; between a grey-hound and a ſpaniel; between a rough dog, and one without hair? You include however all theſe differences under the genus or kind of the ſame animals, becauſe they mix with each other. Do you, however, believe, that all the ſpecies of apes and dogs, which we ſee, deſcend from the ſame origin? But if we give theſe a different origin, why ſhould we not admit the ſame in men, ſince the thing is no leſs probable?

As all the ſpecies of ſea-men are not known, it is impoſſible to determine thoſe from which the various human races particulariſed by figure, diſpoſitions and qualities proper to each, may have deſcended. It is at leaſt certain, that ſome of them who have been taken, reſpired in the common air, as well as in the ſea. However, though the reſpiration in the air is as natural to them as that in the ſea, we ought not to doubt, but the former being ſudden and forced, eſpecially when ſuch a tranſition happens in warm climates, the diverſity of the air and water which they quit, is very prejudicial to the ſpecies. It is not therefore ſurpriſing, that ſea-men taken in temperate or warm climates, have either lived ſo ſhort a time, or by their melancholy air teſtified the change of their health. Men born and bred in plains and certain marſhy grounds, either ſoon die, or are ſubjected to diſorders, when they are obliged to breathe the pure air of the mountains; and theſe born on the mountains, are, as it were, ſuffocated, by reſpiring the groſs air of low and marſhy places. It is for the ſame reaſon, that birds only riſe to a particular height above the earth.

Besides, it is not to be doubted, but nature chuſes proper times and places for the tranſmigration of the ſea-races to the reſpiration of the air. Now, it is certainly towards the poles, and in cold countries, that the diſpoſitions to theſe paſſages are moſt favorable, becauſe in theſe climates the air being always moiſt, and full of thick fogs the greateſt part of the year, is not very dirfferent in cold and moiſture from the water of the ſea—Thus, it is probably in theſe countries that the ſea-race have paſſed and ſtill paſſes moſt frequently from one element to another. Theſe ſea-races may however become terreſtrial in all parts of the globe, by the advantage of certain diſpoſitions, as in deep vallies, where the elevation and proximity of the mountains maintain a perpetual coldneſs and moiſture, and where thick and gloomy foreſts, or large caverns, ſheltered theſe races at their departure from the water from the warm air, which might at that time have been incommodious to their breaſt and lungs.

But it is more probable, that the tranſmigrations of the ſea-ſpecies, always have, and always will be more frequent towards the poles, and in cold climates. It is for this reaſon that the immenſe multitudes of men with which the ſouthern parts of Aſia and Europe are peopled, have come from theſe northern countries. It is alſo for this reaſon, that waters in theſe cold regions, are more fertile in monſtrous fiſh, and ſea-calves, than thoſe of warm climates; and that theſe lands are better ſtocked with birds and animals of unknown ſpecies, than temperate countries. The moiſt and cold air, as I have ſaid, of theſe northern places, is more favourable for the paſſage of ſea-animals from that element to another.

It may, perhaps, be objected, that if men had drawn their origin from the ſea, the tradition of this origin would have been preſerved among them; whereas there is no account now ſubſiſting, except that the earth produced them. But this tradition itſelf favours my opinion. A ſingle reflection will, I am perſuaded, convince you that it is ſo. In what condition do you believe the human races were at their departure from the ſea? Why, being fierce, dumb, and without a power of reaſoning, they have long wandered upon the earth, and inhabited caverns before they had acquired the power of articulating ſounds, appropriating them to certain ideas, and communicating their thoughts and knowledge to their children. There was, no doubt, a long time wherein the memory of the places whence the firſt of them came, was loſt, when they began to ſpeak, and ſtill longer, when they found the art of conveying their ſentiments to poſterity in writing. There are, to this day, nations ſo barbarous, that they hardly have the uſe of ſpeech. Almoſt all the natives of America

and Africa, except thoſe who live on the borders of the Red Sea, and the Mediterranean, are ſtill ignorant of the art of writing.

What could ſavage and barbarous men imagine, as thoſe of the firſt ages were after thier departure from the ſea? and what more reaſonable thought could they entertain of their origin, than that they had been produced by the earth which they inhabited? there was among them no Tradition that they were ſprung from fathers, who had come from the ſea, becauſe theſe fathers had certainly never been in a condition to communicate this knowledge of their origin to their children. Many of theſe people inhabited iſlands, the narrow bounds of which they took for the whole world. Others, though in a country the extent of which they knew not, had never ſeen other men than thoſe of their own family or troop, and, like the others, believing themſelves to be the only inhabitants of the earth. In this ſtate could they imagine any thing more probable, than that the firſt among them was born of the earth?

I have however found in *Witſliet's* Hiſtory, already mentioned, a teſtimony concerning the origin of theſe men who came from the ſea, no leſs ſingular, than natural and probable. In page 89, the author in ſpeaking of the *Chilineſe*, has the following words: 'A great many fabulous things are related of 'this nation; for they ſay that their anceſtors, who were the 'firſt men, proceeded from a certain lake.' The word *proceeded* is ſo expreſſive; that the meaning of the tradition cannot by words be rendered leſs dubious. Let the author treat it as fabulous, as much as he pleaſes, I am yet of opinion, that it deſerves to be tranſmitted to poſterity.

But if the paſſage from the reſpiration of the water to that of the air is natural, if it is proved by a great many facts, and well founded conſequences, the return of the reſpiration of the air to that of the water, though much leſs extraordinary, is yet ſupported by a conſiderable number of examples. I have read in one of the relations of your country, that one Baker, having about forty years ago the command of a Dutch veſſel called the Swallow, and being on the coaſts of Holland, a ſea-man jumped from the ſea amidſt the crew of ſailors, to whom the captain was ſpeaking. Their aſtoniſhment was ſtill increaſed when they heard him ſpeak Dutch, and in that language aſk for a pipe of tobacco, which was readily granted him. He was covered with ſcales, and had hands like the fins of a fiſh. They aſked him, who he was? Upon which he replied, he was a Dutchman, and having embarked when eighteen years of age, in a veſſel which was loſt with all her crew, he had ſince lived in the ſea, without knowing how ſuch a miraculous thing happened. But perceiving

that the captain made a ſign to the ſailors to lay hold of him, he threw away the pipe, and by a ſpring jumped into the ſea.—The captain and company forthwith drew up an account of the fact, which they lodged in the admiralty of Amſterdam, as ſoon as the ſhip landed, and confirmed by their depoſitions.

This fact, however ſingular, will only appear incredible to thoſe who are ignorant of the anatomy of the human body, eſpecially that of the breaſt and lungs, and who have not reflected on what paſſes when we are included in the womb of our mothers. We then live without reſpiration. This reſpiration, which only ſerves to refreſh the blood, and convey it through the arteries to all the parts of the body, for the preſervation of life, is only ſupplied by two apertures, which correſpond to the four large veſſels, through which the blood, on its departure from the heart, paſſes from one veſſel to another, without entering the lungs. Of theſe two apertures the one is called the Foramen ovale, becauſe of its oval ſhape, and was diſcovered but a few years ago. The other is called the Arterial Duct, becauſe of its arterial conſtruction. It ariſes from the Vena Cava, paſſes into the right ventricle of the heart, above the right auricle, and terminates in the pulmonary vein. Its conſtruction is ſuch, that by particular valves, or ſuckers, it permits the blood to circulate from the Vena Cava, into thoſe of the lungs, and hinders it from returning from theſe laſt to the firſt; ſo that in a fœtus, the blood neither paſſes through the lungs, nor enters into the left ventricle of the heart.

Now theſe two canals thus diſpoſed, are dried up and obſtructed, when the infant is born, and after the air entering into the lungs dilates them, and opens another and eaſier road to the blood, in which it circulates ever after. Thus in adults, there are generally no marks of theſe two apertures which ſupply reſpiration in the fœtus. However, it ſometimes happens that theſe apertures are not abſolutely cloſed up, as we find in the diſſections of various bodies. This has been obſerved, eſpecially in famous divers, and in the bodies of criminals which could not be hanged. This formerly, and before anatomy was brought to its preſent perfection, was attributed to the hardneſs of the larynx. It is by means of this conformation that ſea-men and ſea-calves live in the ſea without reſpiration. It is not therefore to be doubted but this young Hollander, who lived in the ſea, without being ſuffocated, had theſe two holes open when he was ſhipwrecked; and that he had reſumed the habit of living without reſpiration, as he did in his mother's belly.

Consult, Sir, the moſt ſkilful ſurgeons, and thoſe who make frequent diſſections, and they will tell you that our bodies

are originally disposed to live without respiration, as well as with it; and our lungs are almost nothing when we are first born.—Hence it happens that sea-men of a considerable age, before they are taken, have no voice, because they want lungs, which are the instrument subservient to the respiration of the air, and because the air is the matter of the voice. Perhaps also they have not the dispositions in the larynx, produced in land-men, nor in the mouth, those which are proper for the just articulation and modulation of sounds. The divers celebrated by antiquity, and of whose history we have preserved the remembrance; these who in the Indies search for pearl, and remain under the water whole hours, and those who are justly famed at present, were subjects in whom these apertures are not entirely blocked up.—If ever we watch a sea-man and dissect him after his death, we shall find that these apertures are subsisting, and that he has no lungs at all, or at least very little, and these withered and decayed.

There is in all men an indelible mark, that they draw their origin from the sea. In a word, consider their skin with one of our lately invented microscopes, which magnify a grain of sand to the bulk of an ostrich's egg, and you will find it all covered with small scales like those of a carp. Besides, we have several men covered with scales visible to the naked eye, which still confirms this origin. If therefore the men who now inhabit the earth, are descended from other men, who live originally in the sea, is it not probable, as the former observations attest, that some of them, especially in their youth, might recover the habit of living in the sea, as their forefathers did?

Is it, after this, surprising, that many of the Greek philosophers should assert, that water was the first principle of all things? Thales, Anaxagoras, and many others, have been of this opinion. Anaximenes gave this prerogative to the air, which amounts to the same doctrine; since, according to Sorel, water is only a condensed air, and air a rarified water, since there is air in water, and water in air, and in both a terrestrial matter, which becomes visible in the sediment. All those who have said, that the earth and the air were the principles of all things, have looked upon water as the cause of the generation of every thing which has either a sensitive or a vegetative life. Has not Homer advanced, that the Ocean was the father of the Gods, and Thetis their mother? Truth has its distinguishing marks even in fable. These factions at least indicate to us, that the memorable men of antiquity, who were by the barbarity of the ages made Gods, owed their origin to the sea, which includes air and earth, and even fire, when her waters are warmed by the rays of the sun. Thus she re-unites in herself every thing that

can concur to the generation of all ſpecies capable of life, animals, trees, and plants.

THIS opinion has not only been eſpouſed by many ancient philoſophers, but alſo lays a foundation for ſeveral concluſive proofs, that men owe their origin to the ſea. How many diſorders do your phyſicians cure only by the uſe of water? Has it not been known to be the moſt ſpeedy and efficacious remedy, to extinguiſh in a patient's veins the ſcorching heat of a fever, which conſumes him? Has it not been found, that of two runners, if the conquered, bathes himſelf and runs afreſh, he will gain the prize, and beat his antagoniſt? The frequent ablutions daily ordered to the Mahometans are indeed religious ceremonies, but at the ſame time things contrived by the wiſdom and knowledge of their legiſlators, as the beſt preſervatives of health. What cures are at preſent produced in England, by plunging patients for two or three minutes in very cold water? What augmentation of ſtrength and vigour do not theſe immerſions produce in perſons who are in a ſtate of health?

THE naturaliſts of the eaſtern countries, where it is cuſtomary for men of eaſy circumſtances, to have baths of their own, aſſure us, that if they copulate with their wives in theſe tepid waters, generation almoſt never fails. Bathing is in theſe countries an infallible remedy for ſterility, provided the huſband embraces the wife in the water. No body doubts, but warm baths excite to the pleaſures of love, and favour generation.—This was the intention of the Romans in erecting baths wherever they could find water. The priapus found at Aix, in ſearching through the old buildings erected at the ſource of the hot waters of that city, ſufficiently indicate the advantages ariſing from theſe baths. It is no doubt from theſe happy qualities obſervable in water, that our poets have feigned that Venus ſprung from the froth of the ſea. Do we not ſtill uſe both natural and artificial baths, in order to cure ſterility in both ſexes.

IF we reflect on all this, have we not reaſon to believe, that as our ſpecies find aſſiſtance in the moſt important myſteries in nature, that is, in the deſire of perpetuating themſelves, in the cure of ſeveral diſeaſes, and the reſtoration of ſtrength, from this ſo favourable element, ſo it muſt be natural to us? If the conſtitution is altered or weakened by diſeaſes, we have no more ſure and ſpeedy method of recalling nature to her functions, and baniſhing her weakneſs, than by re-uniting her to her principle.

BUT, Sir, ſaid I, if the races of terreſtrial animals proceeded from thoſe of the ſea, ſhould we not ſtill obſerve this paſſage, and ſee animals coming from the ſea, very different from thoſe

which came from it long ago? Yes, replied TELLIAMED, you would no doubt obſerve this difference, if you lived in the countries where this tranſmigration happens; that is, in the coldeſt countries, and thoſe neareſt the poles, where I have told you that this paſſage from one element to another muſt occur moſt frequently. The primitive races of men, after their firſt appearance on dry land, muſt have lived much in the ſea, becauſe you know that animals which come from the ſea, are at firſt ſo ſavage, that every thing extraordinary which they either ſee or hear, frightens them, and makes them fly to the ſea again.

BUT granting that this doctorine ſhould not on the firſt view appear probable, yet the fierce and ſavage humour of ſo many of the inhabitants of the cold nations, and of the animals found in them, is a juſt image of the recent tranſmigration of theſe races from the water to the air. This alone is a proof of their late change of ſtate and condition. You may obſerve recent traces of this both with reſpect to men and animals, in almoſt all the parts of the habitable world. Theſe creatures taken by the Dutch on the coaſt of Terra del Feugo in 1708, who only differed from ordinary men by the want of ſpeech; theſe of a human form met with in Madagaſcar, who walk as we do, and who are deprived of the uſe of voice, though both ſpecies comprehend what we ſay; theſe very men, who hardly appear to be men, are perhaps people who have lately come out of the ſea, and who have no voice, juſt as ſome dogs of Canada are deprived of it. But both will certainly acquire the uſe of it in ſome generations to come.

IT is true, all the ſpecies have not the ſame diſpoſitions.—There are now races of blacks in Africa, whoſe language we do not underſtand, either perhaps becauſe they are lately come from the ſea, or becauſe that race is ſo barbarous as not to learn to articulate ſounds juſtly. Perhaps this may proceed from ſome natural defect of the organs. May we not ſafely affirm, that there are certain races of men, as well as ſpecies of trees, which muſt be grafted in others in order to perfect them? Thus from a race, dumb, and without ſenſe, mixed with another more perfect, there is a poſterity very different from the original ſtock produced. A Chineſe which author has aſſerted, that men were only a ſpecies of apes more perfect than thoſe which did not ſpeak. Though I am far from adopting this opinion, yet it is certain that from the copulation of men with them, there ariſes a race which has the uſe of ſpeech. The ſame holds true in the conjunction of men with bears. Near Moſcow, ſome years ago there was found in the cave of a bear, amidſt ſome young bears, a child of nine or ten years of age, who had no uſe of ſpeech, and who probably was begot by that animal and a woman; for

if it had been a child which the bear had carried off, it would probably have had ſome language, unleſs it had been ſnatched from its mother's breaſt. Beſides, it is highly probable, that the bear would not have ſpared it ſo many years, if it had not been his own offspring.

If your countries were leſs peopled with men, ſo long accuſtomed to the land, and civilized, if they had deſart coaſts, where the tranſmigration of races from the water to the air, might be made in the ſilence of never frequented foreſts, you would no doubt be acquainted with examples of this primitive barbarity. I may add that there have lately been, and ſtill are examples of this kind, notwithſtanding the unfavourable diſpoſitions to ſuch a paſſage, in countries where the coaſts and mountains are ſo well inhabited. Of how many monſters found in your country, do hiſtories make mention? Are theſe monſters dragons, or winged ſerpents, as they are repreſented in your books? Are they not perhaps animals juſt eſcaped from the ſea, or carried to land by its waves, though we are not as yet ſufficiently acquainted with their forms?

It is not therefore ſurpriſing, that on account of the ſituation of our countries, we ſhould not obſerve this firſt departure of acquatic animals from the ſea. Let us be content to be witneſſes of the ruſticity and ſtupidity of thoſe who are perhaps lately come from it, and whom we have an opportunity of ſeeing.—What barbarity ſtill reigns among the human races found in Greenland, Spitberg, the country adjacent, to the ſtreights of St. David, and Hudſon's bay? I ſhall not ſpend time in pointing out to you the extreme difference between theſe barbarians, probably lately come from the ſea, and certain races of men, who have come from it long ago. You well enough know the extent of this difference; perhaps a good many generations were neceſſary, and even a change of climate, to bring them to the point of perfection at which ours has already arrived. I am perſuaded that certain races, ſuch as the blacks of ſome of the cantons of Africa, will not arrive at ſuch perfection in fifty ages, except by their mixture with other people of more favourable diſpoſitions.

The learned author of the Origin of Fables, has a piece of reaſoning which agrees perfectly with this ſubject, "according, ſays he, to the traditions of Peru, Inca-Manco-Guyna-Capac, ſon to the ſun, found means by his eloquence to draw from the bottoms of the foreſts, the inhabitants of the country, who lived there after the manner of beaſts, and to make them live under reaſonable laws. Orpheus did the ſame good office to the Greeks, and he was alſo the ſon of the ſun, which ſhews that the Greeks were alſo ſavages as well as the Americans, and that they were

brought from barbarity by the ſame means, ſince the Greeks with all their wit, when they were a new people, did not think more reaſonably than the barbarians of America, who were, according to all appearance. a very new people when they were diſcovered by the Spaniards ; and there is no reaſon to believe, but the Americans would have at laſt thought as reaſonably as the Greeks, if they had had leiſure for it." There is no people in the world, to whom this reaſoning may not be applied.— This we may ſay, ſince after the deluge there was a time when the Aſſyrians, Egyptians, and Chaldeans, notwithſtanding all their wit, thought as unreaſonably as the Americans did, who were a new people when the Spaniards diſcovered them. There is reaſon to believe, that there was a time after the deluge, in which all nations of the earth have been a new race.

I CONCEIVE, Sir, ſaid I to TELLIAMED, that every thing living on the earth may draw its origin from the ſea ; but in order to eſtabliſh this opinion, you have a great difficulty to reſolve, for when in this globe there were no ſpecies perhaps, becauſe they had been totally deſtroyed by fire, as you ſuppoſe that may have happened, how was it peopled without the aſſiſtance of a new creation, or at leaſt without a tranſportation of animals to it, from a new globe where they ſubſiſted before ? How could this tranſmigration have been made ? What to you ſeems ſo difficult, replied the Indian, is by no means ſo. I am now to convince you, that without the help of this new creation, all the ſpecies which now live in the globe might have been there naturally produced, though they had been extinguiſhed.

IN order to underſtand this œconomy of nature, imagine to yourſelf, Sir, that the whole extent of the air which our eyes ſee, the opaque globes they perceive, and thoſe which they do not diſcover, and even the parts of the inflamed globes, which are not as yet penetrated by the fire ; imagine, I ſay, that the whole of this ſpace is full of the ſeeds of every thing which can live on the earth. Beſides, theſe ſeeds are ſo delicate and fine, even for the productions of animals, which grow to the moſt enormous bulk, that it is impoſſible to perceive them with the aſſiſtance of the beſt microſcopes. Some authors have aſſerted that the original ſeeds of living creatures, are little, indiviſible, and conſequently not capable of periſhing in their eſſence.—— Among other proofs of this they affirm, that when they burn the ſeeds of the poppy and the palm-tree ever ſo long, and in ever ſo intenſe a fire, yet if we ſprinkle the aſhes on the ground, and water them, they ſhoot up into poppies and palm-trees.

OBSERVE alſo, that the air we breathe. the aliments we eat, and the water we drink, are ſo full of theſe ſeeds, that they

make a part of it. It is equal to me whether this conſtitution and mixture, are eſtabliſhed by the invariable laws of nature, or by thoſe of the creator. My reaſonings on all the pieces of knowledge I have hitherto acquired, diſcover nothing more probable.

Now theſe ſeeds ſpread in the extent of this vaſt univerſe, are however more numerous round the opaque globes in thick airs, and in waters, than in the immenſe ſpaces by which theſe globes are ſeparated, becauſe they are not fixed there by the ſame arrangements which keep them near the globes. It is almoſt in this manner, that the filings of iron are arranged, and adhere about a loadſtone which attracts them. In this poſition, theſe ſeeds are always ready to yield to the operations of nature.—— There is no inſtant in which ſome of them do not receive diſpoſitions which render them more capable of arriving at life.

What paſſes in the generation of animals by the ſpecies is the image of that which nature alone operates in theſe ſeeds in the boſom of the waters where they are ſpread. The generation of man and moſt other animals by their ſpecies, is according the moſt ſkillful anatomiſts, performed in the following manner;

When the male has arrived at a certain age, the ſeeds of his ſpecies re-unite in him, by the air which he reſpires, and the aliments with which he is nouriſhed, according to a general law of nature, which wills that every thing ſhould tend to be attached to its own ſpecies. Then theſe ſeeds are prepared for fertility in the veſſels of the male, by the diſpoſitions which puberty has put into them. If with a good microſcope you examine the ſeed when warm, you will ſee it compoſed of ſmall animals, like fiſh, which move up and down, but after the ſeed is grown cold they loſe the motion, and, no doubt, the life which they had acquired in theſe veſſels. Hence it is evident, that theſe ſeeds receive in the veſſels of the male, a diſpoſition to life, and to augmentation, which they had not when they were introduced thither.

These veſſels therefore a kind of firſt uterus, where the ſeeds are prepared for a greater growth, which they are to receive in the uterus of the female. In a word, when come to this firſt ſtate, they are poured into the ſecond uterus, there aſſume a much more conſiderable bulk, and acquire ſtrength, by means of which, they are puſhed out either into the water or the air, according as the ſpecies either reſpire the one, or live in the other. Then they have liberty to ſeek for themſelves a ſtronger nouriſhment, by which they arrive at the bulk proper to their

ſpecies, and become capable of contributing to the continuation of that ſucceſſive generation.

The operation of nature alone on theſe ſeeds in the boſom of the ſea, is performed nearly in the ſame manner. The waters with which the globes are ſurrounded, become at certain times, and by certain diſpoſitions, proper for fruitfulneſs. In them is the firſt uterus, in which the ſeeds receive that beginning of extent and motion which they acquire in the veſſels of the male. Your Moſes has, like a great philoſopher, explained this preparation of the waters for the fecundity of the ſpecies which they contain, when he ſays, that in the beginning the ſpirit of God moved on the face of the waters; and in another part, that he covered them; that is, by the heat of the ſun he diſpoſed to fecundity, the ſeeds contained in them, by beginning to unfold theſe ſeeds.

The effect which this ſpirit of life produced on the ſeeds contained in the waters, is juſtified, by what is obſervable in taking a drop of water on the point of a needle from any veſſel in which ſome herbs have been ſteeped for two or three days. By the aſſiſtance of a microſcope we find in this drop of water, a prodigious number of animals, even of different ſpecies; for the different herbs produce different ſpecies. Some of them have a human form, like that of an infant in ſwaddling clothes, their arms being no doubt, too ſlender to appear. Some of them go in a ſtraight line and ſwiftly, while others walk in a round ſlowly. We may ſee them grow, ſince their parts are daily augmented.

Now, Sir, permit me to obſerve to you, that the animals alive in this drop of water, were the ſons of the air, the ſeeds which produced them adhering to the herbs which had grown in the air. This particularity, joined to that obſerved in the ſeed of terreſtrial animals proves, that all are made to live in the water, as well as in the air. The extenſion of this firſt ſenſation of life, which happens to theſe ſeeds, is the ſame effect, which the ſpirit of God, mentioned by Moſes, produced in the ſeeds contained in the waters which firſt covered the globe of the earth. Theſe are the ſame diſpoſitions which they acquire in the veſſels of the male, before they are poured into the ſecond uterus, where theſe beginnings of life are augmented to a certain point.—— Theſe ſeeds, thus prepared for life, in the waters of the ſea, as in their firſt uterus, afterwards, find in the diverſity of the diſpoſitions which the waters diminiſhing daily, continually produces in the bottom, that is, in the fat ſlime, or other more favourable ſubſtances, a ſecond uterus which ſupplies that of the female. It is in this ſlime, by the aſſiſtance of a proper heat, that they acquire a bulk and force ſo conſiderable, as to get out of it, and go in queſt of their nouriſhment in the waters.

I believe, Sir, continued our philoſopher, I have ſufficiently proved the probability of the ſyſtem which makes ter-

reſtrial deſcend from ſea-animals, and which eſtabliſhes the formation of theſe laſt in the ſea, by the ſeeds with which her waters are impregnated, whether theſe ſeeds are ſuppoſed eternal, or whether they exiſt by creation, which you admit. After this it is eaſy to conceive the manner of the generation of all things living, ſenſitive and vegetative, in a globe, whether it is repeopled, or whether it has never been peopled before. Beſides, whether theſe ſeeds have exiſted always, or have been created in time, each of theſe opinions is equally agreeable to my ſyſtem. If I at firſt appeared to defend the former, it was only to convince you that it was not abſolutely without a foundation.

Observe, Sir, that your ſacred books exactly agrees with me, in regard to the formation of the globe, and all the animated beings it contains. They denote all the ſucceſſive ſtates, through which I have ſhewn that the earth has paſſed, before it arrived at that in which we ſee it. They grant, that the earth was originally no more than a rude maſs covered with waters, on which the ſpirit of God moved; that theſe waters diminiſhed by the ſeparation made of them, and becauſe a part of them was tranſported into other places; that by means of this ſeparation, the earth at firſt appeared dry and parched, but was afterwards covered with graſs; that after this it was ſtocked with animals; and that man was the laſt production of God, who had before made all the reſt. Now this is preciſely what I think, and what I have explained to you. The expreſſion ſix days mentioned in your ſacred books, for the perfection of all theſe works, is metaphorical, as you may eaſily imagine. It cannot ſo much as denote the time which the earth employs in turning ſix times round herſelf, in her annual courſe about the ſun, ſince, according to theſe books, the ſun was not made till the fourth day. The perſons have a particular term to expreſs the days in which God created the world according to the tradition of the ancient magi: But as they do not believe that theſe days have been conſecutive, they have placed theſe ſix times in different months of the year, and even aſcribed five days to each of them.

You may alſo conceive, continued Telliamed, that what is there ſaid of the uſe of the ſun, moon and ſtars, ought not to be taken literally. If the ſun enlightens our globe, he alſo renders it warm and fruitful, neither does he refuſe the ſame good offices to the other planets in his vortex. With reſpect to the moon, beſides that ſhe is not luminous of herſelf, and conſequently cannot be called a luminary, if ſhe gives ſome light to the earth in the abſence of the ſun, this only happens during the half of the year, and ſhe herſelf receives the ſame office from the earth. The ſtars would have but a diminutive object, and be of little uſe, if they had been only formed to teach men the knowledge of the ſeaſons. We perceive but the ſmalleſt part of them. What can be the end of thoſe, which, on account of the weakneſs of our eyes, we cannot diſcover? Of

what uſe to our forefathers were thoſe which have only lately appeared? What neceſſity was there, for their advantage, that others ſhould diſappear? Of what ſervice could the ſatellities of Jupiter be to them, or thoſe of Saturn and his ring, the exiſtence of which they were ſo long ignorant of? It is too much ignorance or perſumption in men to perſuade themſelves, that the ſtars were only made for t[illegible] at the ſame time they are ſo uſeleſs to them. It [illegible] abſurd to believe, that they have been only [illegible] ſure. What muſt we then think of this [illegible]? That they were deſtined to elevate man to his creat[illegible] glory and marvellous works of God? I readily grant it; but as they have this in common with all other creatures, it muſt neceſſarily be allowed, that like them, they muſt have been created for another end proper to themſelves, and muſt conſequently have another uſe.

It is but to form a mean judgment of this vaſt univerſe, only to aſcribe an end to it ſo limited as that of the uſe of man.—The views of God are as extenſive and as incomprehenſible as himſelf. To fix a beginning to his works, or condemn them to annihilation, is to find a meaſure and an end to him who has none. He is that being who had no beginning, but gave it to all things, and to that infinity of globes with which we are ſurrounded. Man is in that which we inhabit, the leaſt imperfect image of this eternal and infinite ſpirit. Other globes may contain others far more excellent. When theſe images are effaced in one, they appear in another, perhaps with more perfection.—If a ſun is extinguiſhed, it is ſupplied by a new one. If a globe like our's is ſet on fire, and all the living creatures in it deſtroyed, new generations will make up the loſs in another.—The ſuns, the inhabited globes, and ſuch as are ready to become ſo, will ſubſiſt for ever, even in the viciſſitudes which ſeem to deſtroy them. This perpetuity of motion does not deſtroy either the creation, or the exiſtence of a firſt cauſe. On the contrary, it ſuppoſes a God as its beginning and its origin. If I attempted to carry my ideas farther they would be loſt, as the ſight is in a cloud which it tries to pierce.

The Indian philoſopher here ended the philoſophical diſcourſes which he had promiſed me. I thanked him in the moſt obliging manner I could, for the freſh teſtimony he had given me of his friendſhip, and he made a grateful acknowledgment of all the ſervices I had done him. We embraced each other tenderly, and the next day he ſet out on his journey.

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